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THE

MISCELLANEOUS DOCUMENTS

OF THE

HOUSE OF REPRESENTATIVES

FOR THE

FIRST SESSION OF THE FIFTY-SECOND CONGRESS,

1891-'92.

IN FIFTY-THREE VOLUMES.

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ANNUAL REPORT

OF THE

BOARD OF REGENTS

OF THE

SMITHSONIAN INSTITUTION,

SHOWING

THE OPERATIONS, EXPENDITURES, AND CONDITION OF THE INSTITUTION

FOR THE

YEAR ENDING JUNE 30, 1891.

REPORT

OF THE

U. S. NATIONAL MUSEUM.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1892.

FIFTY-SECOND CONGRESS, FIRST SESSION.

Resolved by the Senate (the House of Representatives concurring), That there be printed of the reports of the Smithsonian Institution and the National Museum for the year ending June 30, 1891, in two octavo volumes, 10,000 extra copies; of which 1,000 copies shall be for the use of the Senate, 2,000 copies for the use of the House of Representatives, 5,000 copies for the use of the Smithsonian Institution, and 2,000 copies for the use of the National Museum.

REPORT

OF THE

U. S. NATIONAL MUSEUM,

UNDER THE DIRECTION OF

THE SMITHSONIAN INSTITUTION,

FOR THE

YEAR ENDING JUNE 30, 1891.

REPORT OF THE U. S. NATIONAL MUSEUM FOR THE YEAR ENDING JUNE 30, 1891.

SUBJECTS.

I. Report of the Assistant Secretary of the Smithsonian Institution, in charge of the National Museum, upon the condition and progress of the Museum.
II. Reports of the Curators.
III. Papers illustrative of the collections in the U. S. National Museum.
IV. Bibliography.
V. List of accessions.

U. S. NATIONAL MUSEUM,
UNDER DIRECTION OF THE SMITHSONIAN INSTITUTION,
Washington, December 1, 1891.

SIR: I have the honor to submit herewith a report upon the present condition of the U. S. National Museum and upon the work accomplished in its various departments during the fiscal year ending June 30, 1891.

Very respectfully,

G. BROWN GOODE,
Assistant Secretary, in charge of U. S. National Museum.

Mr. S. P. LANGLEY,
Secretary, Smithsonian Institution.

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SECTION I.

REPORT

UPON THE

CONDITION AND PROGRESS OF THE U. S. NATIONAL MUSEUM DURING THE YEAR ENDING JUNE 30, 1891.

BY

G. BROWN GOODE,

ASSISTANT SECRETARY OF THE SMITHSONIAN INSTITUTION, IN CHARGE OF U. S. NATIONAL MUSEUM.

REPORT

UPON

THE CONDITION AND PROGRESS OF THE U. S. NATIONAL MUSEUM DURING THE YEAR ENDING JUNE 30, 1891.

BY

G. BROWN GOODE,
Assistant Secretary, Smithsonian Institution, in charge of U. S. National Museum.

A.—GENERAL CONSIDERATIONS.

Before entering upon a detailed statement of the operations of the Museum during the period covered by this Report, it is perhaps not undesirable to briefly outline its history, organization, and aims, in order that the true relationships of the work now to be reported upon, as the outgrowth of the activities of other years, may be comprehended.

The Smithsonian Institution was established by act of Congress in 1846. One of the provisions of the act was that "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens" belonging to the United States should be placed in the custody of the Institution, to be arranged and classified so as to be available for students. It was also provided that a miscellaneous collection of objects known as "the National Cabinet of Curiosities," which had accumulated in the Patent Office, should be transferred to the Institution.* A beginning was thus made for the National Museum, which, however, was not recognized officially under that designation until a later date. The various steps which resulted in the formation of the National Museum are pointed out at some length in a paper printed in Section III of this Report, and entitled "The Genesis of the National Museum."

The Institution from its foundation fostered explorations, and its Museum was enriched by the numerous ethnological and natural history objects brought home by the explorers. Many gifts were received from private sources, and objects of various kinds were deposited in the Museum for safe-keeping.

At the time of the establishment of the Institution numerous important naval expeditions and surveys of the public domain had recently been, or were being, organized by the Government, and during their

* This collection was not accepted by and transferred to the Institution until 1858.

progress very extensive collections of natural history and other objects were made. Important collections from foreign countries were made by the Wilkes Exploring Expedition, Perry's Japan Expedition, and numerous other naval expeditions, while the naturalists attached to the Pacific Railroad Survey, the Mexican Boundary Survey, and other surveys under the Engineer Corps of the Army, brought together great collections of objects illustrating the natural resources and ethnology of the United States.

At a somewhat later period, when the geological surveys of the Territories were organized, large additional collections were formed.

A new source of increment was opened by the investigation of the Fish Commission into the aquatic fauna of the continent.

At the close of the Centennial Exhibition in 1876 the exhibits of the United States Government, as well as those of numerous foreign governments and of private exhibitors, came into the possession of the National Museum.

Since 1876, though the growth of the Museum has been much more rapid, no single source of increment has predominated. The complexity of the collections, however, has been greatly increased. The collections are now more than sixteen times as large as in 1882, which was the first year of systematic work in the new Museum building.

Among the principal sources of miscellaneous increase since the Centennial Exhibition may be mentioned the Fisheries Exhibitions of Berlin and London, the New Orleans Cotton Centennial Exposition in 1884 and 1885, and the Cincinnati Exposition in 1887. A large amount of material has also been derived through exchange with museums and individuals at home and abroad.

With the acquisitions from the Centennial Exhibition a new epoch began in the history of the Museum. The storage rooms and exhibition halls of the Smithsonian building were overflowing with the accumulations of thirty years, and the small number of persons employed in caring for them were overburdened and unable to keep abreast with the necessary work. Furthermore, as already stated, the complexity of the collections had very largely increased, necessitating a new and broader classification. The growth of the country in wealth and culture led to the establishment of many local museums, and the educational influences flowing from these and from the Centennial Exhibition caused a demand for better systems of installation and explanation of the collections.

On account of these circumstances an appeal was made to Congress for a new building for the National Museum and for increased appropriations for its maintenance. A new building was provided for in 1879 and a complete reor-anization of the Museum was undertaken two years later.

By law the Secretary of the Smithsonian Institution is *ex officio* director of the Museum. He is empowered to employ suitable assistants for

carrying on the work of the Museum, for whose action he is responsible to the Regents of the Institution. For many years the work was carried on by Prof. Baird with no more than two or three assistants. The Museum was not formally divided into departments. When the reorganization was made, the diversity of the collections made it necessary to institute numerous departments, each of which was placed in charge of a curator. The number of curators changes with the changing necessities of the Museum. At present the scientific staff is composed of the assistant secretary of the Smithsonian Institution in charge of the National Museum, and thirty-two curators and acting curators, twenty-two of whom receive no salary from the Museum. There are also eleven administrative departments. (A list of the scientific departments and of the officers in charge of them is given on page 21.)

Three factors at least are necessary for the proper administration of a large museum. A philosophical classification must be adopted, sufficiently comprehensive and elastic to facilitate the distribution of the objects in the collections. A staff of assistants must be employed, competent to make the proper classification of the objects placed in their care, and to prevent their deterioration. A system of installation and arrangement must be devised, which will permit a satisfactory examination of the collections by students and others.

The matter of classification has engaged the thought of the officers of the Museum for many years. The chief difficulties are encountered in the classification of those collections which illustrate the history of human culture, on account of the intricacy of the subject and its manifold aspects and relationships. Some remarks on this branch of classification, which can not be repeated in this outline, will be found in the report for the year 1884. In the zoölogical, botanical, and geological departments, which form a considerable portion of the Museum, a satisfactory classification is more easily determined upon on account of the labors of systematic naturalists, running back for two centuries.

In the arrangement and installation of the collections the interests of three classes of persons have to be kept in view—those engaged in independent researches, students in colleges and schools, and casual visitors. So far as the investigator is concerned, it is only necessary that the objects in a Museum should be preserved in good condition and so arranged as to be available for study. The college student demands something more. To be of the highest service to him, objects must be arranged in series, without duplication, each showing the various phases of some one subject or the development of an idea or the modifications of a type of structure; and must, furthermore, be labeled in such a manner that the reason for their exhibition is unmistakable. He must, in other words, have presented to him a variety of object-lessons. The casual visitors, who in point of numbers exceed the other classes, make quite different demands. They do not come to a Museum to study in detail any single group of objects, but from intelli-

gent curiosity to see the wonders of nature, the masterpieces of art, and those things which illustrate in the most striking manner the history and progress of civilization. They demand that the collections shall be conveniently and attractively arranged and provided with brief and legible labels. An attempt is made in the National Museum to meet the demands of all these classes. Large numbers of specimens, in addition to those in the exhibition cases, are preserved for use in researches, and these are frequently loaned for study, or (in the zoölogical departments) are given freely to investigators for dissection and other similar purposes. As far as possible, educational series of objects similar to those in the Museum are made up from the duplicate specimens and distributed to educational institutions throughout the country. In this way the advantages of the Museum are extended to many who have never been within its walls. (A statement of the distributions during the year will be found on page 35.)

In the matter of cases and appliances the Museum makes use of those forms which experience at home and the study of the museums of Europe have demonstrated to be the best. Many forms of cases which have been designed or perfected by the officers of the National Museum are in use in other museums both in the United States and elsewhere.

The importance of labels is fully understood by the officers of the Museum, and much time is spent every year in their preparation. The Museum enjoys the advantage of having printed labels in place of written ones. Their legibility and attractiveness is thus greatly increased.

Every museum has its special characteristics growing out of its form of organization, its location, scope, and financial and other resources. The character of the National Museum is fundamentally affected by its connection with the Smithsonian Institution, its dependence upon Congress for appropriations annually, and the necessity under existing laws of its caring for all collections belonging to the Government.

Of the connection of the Museum with the Smithsonian Institution nothing but good can be said. It should be borne in mind that it is in part a Smithsonian Museum, since, especially in its earlier history, the Institution expended considerable sums of money in aiding explorations with the distinct purpose of increasing the collections in certain directions. It has had in addition, for nearly half a century, the use of the larger portion of the Smithsonian building, and what is of paramount importance, the guidance and influence of the officers of the Institution, and the very valuable assistance of its numerous correspondents.

The necessity of depending on appropriations made annually, while unavoidable under our system of government, is not without serious drawbacks. It renders difficult or impossible the carrying out of many far-reaching plans for the symmetrical growth of the Museum, and places it at a disadvantage with endowed museums under private auspices.

The necessity of caring for Government collections of many kinds gives, as already stated, a very wide scope to the Museum, and impresses upon it characteristics scarcely to be found in any other similar organization. What is here brought together in two buildings has its counterpart in England, Germany, France, and other European countries in groups of museums, each with a limited and well-defined scope.

It is unnecessary to enter a plea for the right of a national museum to exist. Its establishment is not forced upon the country. It grows up unsolicited as a consequence of the activities of an enlightened Government. Through a thousand channels materials for the formation of a museum come into the possession of the Government. It can not be questioned that it is in every way most desirable that these should be brought together in one place, where they can be classified and arranged for examination and study. A museum formed in this manner, however, suffers sooner or later from the immense accumulation of objects of the same kind in certain directions and from deficiencies in others. It has been so in the case of the National Museum. At the outset no addition was unwelcome, and the expectation that all important deficiencies would be supplied might properly be indulged in. As the years have passed, however, it has become more and more apparent that many of these deficiencies would only be made good by the purchase of the necessary objects, and the importance of increased appropriations for the purchase of collections and single objects to complete the various series in the Museum is very strongly felt.

In its present condition the Museum may be likened to a book from which pages here and there have been omitted, so that the narrative is disjointed and incomplete. There are instances in this country in which more money is expended for the improvement of private museums than is expended for the National Museum. In certain museums of Europe more money is expended annually in purchases than is represented by the entire appropriations for the National Museum. The officers of the Museum have repeatedly suffered the chagrin of being compelled to refuse the offer of specimens necessary to complete the collections, and to see them pass into the hands of private institutions in this country or the government museums in Europe.

B.—ORGANIZATION AND SCOPE OF THE MUSEUM.

The National Museum is under the direction of the Smithsonian Institution, which is governed by an establishment consisting of the President of the United States and his Cabinet, the Commissioner of Patents, and the Board of Regents, which latter is composed of the Vice-President, Chief Justice of the United States, three members of the Senate, three members of the House of Representatives, and six other citizens not members of Congress, two of whom are residents of the city of Washington.

The Secretary of the Smithsonian Institution, to whom is intrusted the actual management of its affairs, is by law the "keeper of the collections." The scientific staff at the present time, as already stated, is composed of the Assistant Secretary of the Smithsonian Institution in charge of the National Museum and thirty-two curators and acting curators, twenty-two of whom receive no salary from the Museum appropriation. There are also eleven administrative departments.

PRINCIPAL SOURCES OF THE COLLECTIONS.

The collections of the Museum are made up, in large part, of the following materials:

(1) The natural history and anthropological collections, accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

(2) The collection of the Wilkes exploring expedition, the Perry expedition to Japan, and other naval expeditions.

(3) The collections of the scientific officers of the Pacific Railroad survey, the Mexican boundary survey, and of the surveys carried on by the Engineer Corps of the Army.

(4) The collections of the United States geological surveys under the direction of the United States geologists, Hayden, King, and Powell.

(5) The collections of the U. S. Fish Commission.

(6) The gifts by foreign governments to the Museum, or to the President or other public officers of the United States who are forbidden by law to retain such gifts in their private possession.

(7) The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country on the occasion of the International Exhibition at Philadelphia in 1876; the fishery collections displayed by the United States at the International Fisheries Exhibition at Berlin in 1880 and at London in 1883, and the collections obtained from various local expositions; as, for instance, the New Orleans Cotton Centennial Exposition, in 1884 and 1885, and the Cincinnati Exposition, in 1887.

(8) The collections given by the governments of the several foreign nations, thirty in number, which participated in the exhibition at Philadelphia in 1876.

(9) The industrial collections given by numerous manufacturing and commercial houses of Europe and America at the time of the Philadelphia exhibition and subsequently.

(10) The material received, in exchange for duplicate specimens, from the museums in Europe and America at the time of the Philadelphia exhibition and subsequently.

(11) Collections received as gifts, deposits, or in exchange, from individuals, numbering usually from 1,000 to 1,500 each year.

C.—SPECIAL TOPICS OF THE YEAR.

INCREASE IN THE COLLECTIONS DURING THE DECADE 1881–1891.

At the close of 1881 a census of the collections was taken, resulting in the preparation of a table, published in subsequent reports, which gave 193,362 as the approximate total number of specimens of all kinds at that time entered in the catalogue books of the several departments of the Museum. The census for the year ending June 30, 1891, places the total number of specimens of all kinds at 3,028,714, showing an increase of about nineteen-fold during the decade. It must, however, be stated that a large proportion of the material catalogued in 1884 and in later years, had been in the custody of the Smithsonian Institution for several years, but had remained in storage on account of there being no opportunity to have it classified and entered in the catalogue books. In this way the immense increase in the totals for 1884 as compared with those for 1882 may be partly accounted for.

There still remains in the basement of the Smithsonian building and in the old Armory building a considerable amount of material, consisting largely of gifts from foreign governments and contributions from expositions, which has not yet been brought under control, owing to lack of space and other necessary facilities.

INCREASE IN THE MUSEUM LIBRARY.

The number of publications added to the Museum Library during the year was 12,854, including 922 books of more than 100 pages, 2,492 pamphlets, 9,280 parts of serials, and 160 charts.

INCREASED EDITION OF MUSEUM REPORTS.

In place of 16,000 extra copies, the Fifty-first Congress has ordered that 19,000 copies of reports of the Museum be printed. This will allow 3,000 copies to be set apart for distribution by the Museum to its contributors and correspondents.

VISITORS.

The number of visitors to the Museum building during the year ending June 30, 1891, was 286,426, and during the same period 111,669 persons visited the Smithsonian Institution. The total number of visitors since 1881 (during the last decade) to the Museum building is 2,398,375, and to the Smithsonian Institution 1,081,681.

MUSEUM APPROPRIATIONS FOR 1891–'92.

Preservation of collections	$145,000
Furniture and fixtures	25,000
Printing	15,000
Heating and lighting	12,000
Purchase of Capron collection	10,000
Repairing floors, etc	5,000
Duty on glass, etc	1,000
Postage, etc	500
Total	213,500

PROPOSED ADDITIONAL MUSEUM BUILDING.

On January 9, 1891, the bill providing for a new Museum building was favorably reported from the House Committee on Public Buildings and Grounds, but failed of passage.

CAST OF STATUE OF LIBERTY.

Through the coöperation of the Architect of the Capitol, Hon. Edward Clark, the original full-size plaster model of Thomas Crawford's statue of liberty was transferred from the crypt in the Capitol to the Museum. The bronze was cast by Clark Mills, at his foundry, near Bladensburg, Md., in 1860, and is 19 feet 5 inches in height. This model had been stored in a cellar room of the Capitol, and had unfortunately been broken into fragments, when the work of transferring it to the Museum was undertaken by Theodore A. Mills, an employé of the Museum.*

THE DAGUERRE MEMORIAL.

On August 15, 1890, a bronze statute of Daguerre was unveiled in the rotunda of the National Museum building, by the Secretary of the Interior. This monument, in honor of Louis Jacques Mandé Daguerre, was presented by the Photographers' Association of America, which was holding its annual meeting in Washington at that time. Daguerre, in coöperation with Joseph Nicéphore Niepce, invented and perfected the daguerreotype, the announcement of which was made at the session of the French Academy of Sciences, in 1839. The monument is 11 feet in height, and is made of bronze and granite. It represents Fame fastening a garland around the head of Daguerre. The garland also encircles the globe, thus typifying the universal benefit of his invention. The monument is the work of Jonathan Scott Hartley.

THE CAPRON COLLECTION.

This collection, consisting of gold lacquers, bronzes, porcelains, carvings in ivory and wood, and many other works of art, was obtained by the late Gen. Horace Capron while United States minister to Japan. A bill for its purchase was introduced into the Senate on March 1, 1888 (Fiftieth Congress, first session), by Senator Daniel W. Voorhees, and passed the Senate on March 31. On August 8 of the same year Mr. O'Neill, of

* The following order, issued by Hon. John B. Floyd, Secretary of War, May 24, 1860, may be of interest in this connection:

"The proposed statue of Freedom, modeled by Crawford, for the dome of the Capitol, will be cast by Clark Mills at his foundry near Bladensburg under the direction of Capt. William B. Franklin of the Topographical Engineers in charge of the Capitol Extension. Mr. Mills will be paid for his services and for the rent of his foundry at the rate of $400 per month from the commencement to the termination of the work. The materials, fuel, labor, and everything necessary for the casting of the figure will be supplied by the Government."

Pennsylvania, from the Committee on the Library, submitted a report stating that, in the opinion of the committee, the collection should be purchased by the Government and placed in the National Museum. This bill did not pass the House. It was again introduced into the Senate on December 4, 1889, by Senator Voorhees, and passed the Senate on March 29, 1890. It was also reported a second time from the House Committee on the Library, on May 19, 1890, but failed to pass. In the sundry civil bill for the year ending June 30, 1892, an appropriation of $10,000 was made for the purchase of this collection.

The lacquered objects are the most valuable in the collection, particularly the four specimens which bear the crest of one of the families of the Shoguns. The bronzes are forty-six in number, and in addition there are two objects in silver bronze and one in gold bronze, representing birds and flowers. The ivory carvings are thirty-seven in number. There is also included a collection of sixty-three Japanese coins, thirty-five of which are of gold.

When Gen. Capron returned to the United States, he generously placed these treasures in the custody of the Smithsonian Institution, where they were exhibited. After his death, in 1885, Mrs. Capron signified her desire to allow the collection to remain in the Institution. It has always attracted a great deal of attention from visitors of all classes, and its acquisition by the Government of the United States is a source of congratulation.

TYPES OF THE OWEN COLLECTION OF FOSSILS.

The Owen type specimens of fossils, mentioned on page 759 of the report of the National Musem for 1888 as having been "presented" to the Museum by the Indiana State University through the courtesy of the university, will be retained in the National Museum as a "deposit" subject to the order of the board of trustees of the university. These specimens have been described and illustrated in Government publications.

MEETINGS OF ASSOCIATIONS IN WASHINGTON DURING THE YEAR.

Washington has during recent years been selected as the place for holding meetings of a large number of national and international societies of all kinds. Each year has seen an increase in this respect, and the matter has now become of such importance (not so much, however, on account of the *number* as of the *character* of the societies) that it seems proper to make mention of it in a report which is intended to contain in a general way a reference to all efforts to develop and encourage research, both from a scientific, economic, and a literary point of view. There is probably no place in the country better suited for such meetings. The seat of government and center of political activity has become accustomed to receiving and entertaining organizations.

During the last fiscal year numerous learned bodies met in various halls in this city. The many attractions of the capital, the opportunity of easy access to public record offices and the Congressional Library, the general interest of the Government buildings, combine to make Washington a favored city for such purpose. During the last fiscal year the following organizations, among others, held their meetings here:

Photographers' Association	Aug. 11.
Association of Official Agricultural Chemists	Aug. 28–30
Convention of American architects	Oct. 22–24.
Convention of iron and steel men	Oct. 25.
American Ornithologists' Union	Nov. 18–20.
American Economic Association	Dec. 30.
American Forestry Association	Dec. 30.
American Historical Association	Dec. 30.
National Dairy and Food Commissioners' Association	Jan. 14, 15.
National American Woman's Suffrage Association	Feb. 16.
The National Mary Washington Memorial Association	Feb. 25.
Triennial meeting of the Woman's National Council	Feb. 25.
Southern Tariff Association	Mar. 25.
American Association of Inventors and Manufacturers	Apr. 8–10.
National Academy of Sciences	Apr. 21–24.
Association of Medical Superintendents of American Institutions for the Insane	Apr. 29.
American Academy of Medicine	May 2–4.
Conferences of State Boards of Health	May 2–4.
American Fisheries Association	May 27, 28.
National Geographical Society	

PARTICIPATION OF THE SMITHSONIAN INSTITUTION IN THE WORLD'S COLUMBIAN EXPOSITION.

Mention was made in the last report of the provision by Congress for holding an Exposition in the city of Chicago in 1893 for the purpose of celebrating the four hundredth anniversary of the discovery of America by Christopher Columbus. Dr. G. Brown Goode, assistant secretary, in charge of the National Museum, was appointed by the President the representative of the Smithsonian Institution and the National Museum upon the Government Board of Managers and Control. Dr. Goode was invited by the Government Commission to prepare for its use a preliminary plan of classification for the Exhibition. This was done, and in September, 1890, a "draft of a system of classification" was presented to the Committee on Classification. It formed the basis of the classification subsequently adopted, although modified of course by the necessities of the case and the peculiar views of the executive heads of the various departments of the Exhibition. This classification has never been published, although a small edition was printed for the use of the committees. It was, however, never made accessible for general use. It was published under the following title: "First Draft of a System

of Classification for the World's Columbian Exposition." In the preparation of this classification an exhaustive study was made of all classifications which had been published in connection with previous exhibitions. Since up to the present time no attempt has been made to prepare a scheme so generally comprehensive, it is reproduced in the Appendix (Section III) to this report, in the hope that it may be useful to persons who are engaged in exhibition or museum administration.

During the latter part of the year the Treasury Department decided that the sum of between $30,000 and $40,000 was available for expenditure in connection with the preparation of the Government exhibits. This sum was divided among the executive departments, including the Smithsonian Institution, the National Museum, and the Fish Commission; the Smithsonian Institution, including the National Museum and the Bureau of Ethnology, receiving about $6,000. As soon as this money became available, several of the curators in the National Museum commenced work upon the special exhibits of their departments, and a force of taxidermists and mechanics was engaged. Mr. R. Edward Earll was appointed chief special agent in April, and will act as the executive officer under the direction of the representative of the Smithsonian Institution.

PATENT CENTENNIAL CELEBRATION.

The celebration of the beginning of the second century of the American patent system by a Congress of American Inventors and Manufacturers was held on April 8, 9, and 10, 1891. A committee of citizens of Washington was appointed to carry out the details. Mr. J. E. Watkins, curator of the section of transportation, was appointed secretary. The ceremonies consisted of a series of meetings at which addresses relating to the history and influence of invention were delivered by prominent statesmen, inventors, political economists, and engineers. During the meetings a loan collection was installed in the lecture hall of the National Museum, where machines of antique design, models, and early patents were inspected and studied. In this collection were patents signed by Washington, Madison, and Monroe, the first two talking-machines, an antique electrical railway constructed in 1837, the original Morse telegraph instruments, the first photographic camera made in the United States, the original typewriting machine from which the perfected Remington typewriter was constructed, early forms of sewing machines, besides other curious and useful devices, many of which have been donated to the Museum, and are now on exhibition. Prof. Otis T. Mason, curator of ethnology, read a paper before the congress, entitled "The Birth of Invention."

BOARD ON GEOGRAPHIC NAMES.

Prof. Otis T. Mason, curator of ethnology in the National Museum, was appointed by the President of the United States a member of the

Board of Geographic Names. The decisions of this Board in regard to the spelling and pronunciation of geographical names will be accepted as final.

NECROLOGY.

Mention should be made of the death of Mr. William Wesley, of London, on April 17, 1891. For nearly thirty years he was identified with the Smithsonian Institution as its agent in the transmission of books and other material, through the Bureau of International Exchanges.

D.—THE CONDITION OF THE COLLECTIONS.

It is evident, from a perusal of the reports of the curators, that special effort has been made during the year to bring the collections into as satisfactory a condition as possible. The lack of space for the installation of additional specimens in most of the departments renders further development, so far as the exhibition series are concerned, impracticable.

A large proportion of the accessions is reserved for the duplicate and study series, and the increase during the year, including the specimens intended for exhibition, is indicated in the following table:

Departments.	No. of specimens.	Departments.	No. of specimens.
Arts and industries:		Reptiles and batrachians	885
Materia medica	168	Fishes	4,737
Animal products	45	Vertebrate fossils	9
Domestic animals (for mounting)	31	Mollusks (including cenozoic fossils)	5,000
Historical collection, coins, medals, paper money, etc.	3,000	Insects	12,000
Musical instruments	95	Marine invertebrates	6,750
Transportation and engineering	222	Comparative anatomy:	
Modern porcelain, porcelain and bronzes	12	Mammals (skulls and skeletons Birds Reptiles and batrachians	655
Physical apparatus	10	Invertebrate fossils:	
Graphic arts	374	Paleozoic	615
Ethnology	1,800	Mesozoic	8,449
American aboriginal pottery	1,219	Fossil plants	178
Oriental antiquities	2	Recent plants	40,963
Prehistoric anthropology	4,084	Minerals	7,135
Mammal (skins and alcoholics)	465	Geology	31,400
Birds	2,382		133,610
Birds' eggs and nests	925		

In order to present a basis for comparison in the matter of the growth of the collections during previous years and in 1891, the following table is presented, showing the annual increase since 1881:

Table showing annual increase in the collections since 1881:

Name of department.	1882.	1883.	1884.	*a* 1885-'86.	1886-'87.	1887-'88.	1888-'89.	*b* 1889-'90.	1890-'91.
Arts and industries:									
Materia medica		4,000	4,442	4,850	5,516	5,762	5,942	*c* 5,915	6,083
Foods		*d* 1,244	1,580	*e* 822	*f* 877	*g* 877	911	1,111	1,111
Textiles			2,000	3,063	3,144	*g* 3,144	3,222	3,288	3,288
Fisheries			5,000	*e* 9,870	10,078	*g* 10,078	*g* 10,078	10,080	10,080
Animal products			1,000	2,792	2,822	*g* 2,822	2,948	2,949	2,994
Graphic arts								600	974
Transportation and engineering								1,250	1,472
Naval architecture			600				*g* 600	*h* 600	600
Historical relics				1,002	13,634	14,640	14,990	20,890	23,890
Coins, medals, paper money, etc				1,005					
Musical instruments				400	417	427	427	447	542
Modern pottery, porcelain, and bronzes				2,278	2,238	3,011	3,011	3,132	3,144
Paints and dyes				*e* 77	100	*g* 100	109	197	197
"The Catlin Gallery"				500	500	500	*i* 500		
Physical apparatus				250	251	*g* 251	*g* 251	263	273
Oils and gums				*e* 197	198	*g* 198	213	1,112	1,112
Chemical products				*e* 659	661	*g* 661	688		
Domestic animals								66	97

a No census of the collection taken for first half of 1885.

b The actual increase in the collections during the year 1889-'90 is greater than appears from a comparison of the totals for 1889 and for 1890. This is explained by the apparent decrease in the collections of the department of lithology and metallurgy, which is due to the rejection of worthless material.

c Although about 200 specimens have been received during the year, the total number of specimens in the collection is now less than estimated for 1889, owing to the rejection of worthless material.

d Including paints, pigments, and oils.

e Duplicates not included.

f Foods only.

g No entries of material received during the year have been made on the catalogue.

h No estimate of increase made in 1890.

i Hereafter to be included in the historical collections.

Table showing annual increase in the collections since 1881—Continued.

Name of department.	1882.	1883.	1884.	*a* 1885–'86.	1886–'87.	1887–'88.	1888–'89.	*b* 1889–'90.	1890–'91.
Ethnology			200,000	*c* 500,000	503,764	505,464	506,324	508,830	510,630
American aboriginal pottery			12,000	25,002	*c* 26,022	*c* 27,122	28,222	29,269	30,488
Oriental antiquities							850	3,485	3,487
Prehistoric anthropology	35,512	40,491	45,252	65,314	101,659	108,631	116,472	123,677	127,761
Mammals (skins and alcoholics)	4,660	4,920	5,694	7,451	7,811	8,058	8,275	8,836	9,301
Birds	44,354	47,246	50,350	55,945	54,987	56,484	57,974	60,219	62,601
Birds' eggs and nests			40,072	44,163	*d* 48,173	50,055	50,173	51,241	52,166
Reptiles and batrachians			23,495	25,344	27,542	27,664	28,405	29,050	29,935
Fishes	50,000	65,000	68,000	75,000	100,000	101,350	107,350	122,575	127,312
Vertebrate fossils								*e* 512	521
Mollusks	*f* 33,375		400,000	*g* 460,000	425,000	455,000	468,000	471,500	476,500
Insects	1,000		151,000	*e* 500,000	*e* 585,000	595,000	603,000	618,000	630,000
Marine invertebrates	*f* 11,781	*f* 14,825	*e* 200,000	*e* 350,000	*e* 450,000	515,000	515,300	520,000	526,750
Comparative anatomy:									
Osteology	3,535	3,640	4,214	10,210	*e* 11,022	11,558	11,753	12,326	12,981
Anatomy	70	103	3,000						
Paleozoic fossils		20,000	73,000	80,482	84,491	84,649	91,126	92,355	92,970
Mesozoic fossils			100,000	69,742	70,775	70,925	71,236	71,305	79,754
Cenozoic fossils	(Included with mollusks.)								
Fossil plants		4,624	*h* 7,291	*i* 7,129	8,462	10,000	10,178	10,507	10,685
Recent plants				30,000	*e* 32,000	*e* 38,000	38,459	*j* 39,654	80,617
Minerals		14,550	16,610	18,401	18,601	21,896	27,690	37,101	44,236
Lithology and physical geology	*k* 9,075	12,500	18,000	20,647	*e* 21,500	22,500	27,000	*l* 32,762	*e* 64,162
Metallurgy and economic geology		30,000	40,000	48,000	*e* 49,000	51,412	52,076		
Living animals						220	*m* 491		
Total	193,362	263,143	1,472,600	2,420,944	2,666,335	2,803,459	2,864,244	2,895,104	3,028,714

a No census of the collection taken for first half of 1885.

b The actual increase in the collections during the year 1889–'90 is greater than appears from a comparison of the totals for 1889 and for 1890. This is explained by the apparent decrease in the collections of the department of lithology and metallurgy, which is due to the rejection of worthless material.

c Estimated.

d Including nests.

e Only a small portion of the collection represented by this number was received during the year 1889–'90.

f Catalogue entries.

g Including Cenozoic fossils.

h Fossil and recent plants.

i Exclusive of Prof. Ward's collection.

j This relates only to specimens received through the Museum, and does not include material added to the National herbarium through the Department of Agriculture.

k In reserve series.

l Collections combined in October, 1889, under department of geology. The apparent decrease of more than 50 per cent of the estimated total for 1889 is accounted for (1) by the rejection of several thousands of specimens from the collection, and (2) by the fact that no estimate of the specimens in the reserve and duplicate series is included. Of the total for 1890 about 16,000 specimens consist chiefly of petrographical material stored away for study and comparison in the drawers of table cases.

m Transferred to the National Zoölogical Park

SM 91, pt 2——2

CATALOGUE ENTRIES.

The number of catalogue entries made in the books of the several departments during the year amounts to 21,942. Under one entry may be mentioned one specimen, or a large number of specimens, if from the same locality or of the same species. The following table shows the number of entries made in each department during the year:

Departments.	No. of specimens.	Departments.	No. of specimens.
Arts and Industries:		Reptiles and batrachians	908
Materia medica	168	Fishes	1,542
Animal products	45	Vertebrate fossils	458
Domestic animals (for mounting)	97	Mollusks (including cenozoic fossils)	5,605
Historical collections, coins, medals, paper money, etc	56	Insects	174
Musical instruments	95	Marine invertebrates	1,239
Transportation and engineering	122	Comparative anatomy:	
Modern pottery, porcelain, and bronzes	12	Mammals (skulls and skeletons), Birds, Reptiles and batrachians	655
Physical apparatus	10	Paleozoic fossils	205
Graphic arts	1,326	Mesozoic fossils	1,488
Ethnology	1,504	Fossil plants	40
American aboriginal pottery	33	Recent plants	44
Prehistoric anthropology	933	Minerals	1,131
Mammals, skins, and alcoholics	465	Geology	873
Birds	2,382	Total	21,942
Birds' eggs and nests	332		

It may perhaps interest those who are watching the growth of the national collections, to observe the figures in the following table, which show the number of entries made in the catalogue books of the several departments during the decade now completed, and also during the previous decade—that is, before the occupancy of the Museum building.

Number of entries made in the catalogue books of the National Museum during the decades 1871 to 1880 and 1881 to 1890, respectively.

Year.	No. of cat. entries.	Year.	No. of cat. entries.
1871	5,041	1881	24,470
1872	8,387	1882	26,588
1873	10,704	1883	28,590
1874	10,332	1884	28,195
1875	12,578	1885	26,796
1876	23,675	1886	52,116
1877	11,398	1887	36,695
1878	9,973	1888	26,891
1879	11,552	1889	23,442
1880	14,586	1890	28,293
Total	118,226	Total	332,076

DEVELOPMENT AND ARRANGEMENT OF THE EXHIBITION SERIES.

The growth of the exhibition series in the various departments of the Museum has been greatly retarded on account of the crowded condition of the Museum building.

In the Section of Graphic Arts the labeling of specimens on exhibition has been continued and the cataloguing of the Osborne collection completed. In the Section of Transportation and Engineering an attempt has been made to secure a series of objects illustrating the birth and development of the mechanical arts, with special reference to the evolution of the epoch-making inventions. The labeling and cataloguing of specimens in the exhibition series has been completed. The study and exhibition series have been increased by a collection of engravings, prints, photographs, and drawings of locomotives, cars, bridges, and other railroad apparatus and appliances. In order to provide room for the display of valuable objects acquired during the year, it was found necessary to rearrange the entire exhibition series, and many objects were installed on the tops of cases, or on brackets, with a view to greater economy of space. Considerable progress was made in the Department of Ethnology in connection with the installation of the series of bows, arrows, and shields. An exhibition series of time-keeping apparatus has been commenced, and a card-catalogue of the ethnological series was begun. A series of type portraits of mankind, 33 in number, was prepared by Mr. A. Zeno Shindler. A series of fire-making implements was arranged by Mr. Walter Hough. Preparations were commenced at the close of the fiscal year for an ethnological exhibit at the World's Fair. In the Department of Prehistoric Anthropology the collections have been rearranged according to locality, necessitating a change in the location of the cases and a rearrangement of the material in the trays. Six months were required for the completion of this work. The preparations for an exhibition of mammals at the World's Fair have somewhat retarded progress in the installation and arrangement of the exhibition series. In the Department of Birds five exhibition cases were filled with specimens, properly arranged and labeled, and a large portion of the study collection of American *Passeres* and *Picariæ* was entirely rearranged. The installation of the collection of reptiles and batrachians in jars was continued during the year, and the reserve series of North American batrachians was arranged in systematic order. The space assigned to the Department of Vertebrate Fossils is greatly overcrowded, thus preventing a complete arrangement of the study and exhibition series, a large amount of unclassified material being in storage. The Department of Mollusks has shown considerable activity in the development of its exhibition series during the year. The Lea collections have been placed in permanent shape. The Naiades have been placed on exhibition in new cases. The reserve collection in the Department of Insects

has steadily increased, and the exhibition series is now arranged in permanent shape. Additional accommodations have been provided for the Department of Marine Invertebrates, whereby space is provided for seven additional unit cases. The development of the exhibition series will be deferred until the west hall is again ready for occupation. In the Department of Comparative Anatomy the work of labeling the series has been commenced and a tentative plan for a synoptic exhibition series has been arranged. The honorary curator of Paleozoic fossils, Mr. C. D. Walcott, finds it very difficult to handle the large amount of material received, owing to the limited laboratory room, and over 50 boxes of material have been placed in storage in order to obtain room for the collections desired for immediate study. The collection of mesozoic fossils, under the charge of Dr. C. A. White, have been rearranged in cases, and are now in much better condition for examination and study than before. The collection of fossil plants, under the supervision of Prof. Lester F. Ward, honorary curator, has been rearranged geographically during the year, and the series of cretaceous and tertiary specimens have been catalogued. In the Mineral Department a nearly complete rearrangement of the systematic series was carried out during the year by Mr. Wm. S. Yeates, under the direction of Prof. F. W. Clarke, honorary curator. A new case was built across the east end of the west-south range, affording to the Department of Geology accommodations for the collection of structural color and the specific gravity series, as well as for the larger collections in historical geology.

E.—THE MUSEUM STAFF.

THE SCIENTIFIC STAFF.

The personnel of the scientific departments of the Museum has undergone but little change during the last fiscal year.

Capt. J. W. Collins, who has been in charge of the section of naval architecture for several years, has recently been appointed honorary curator of the section of fisheries.

Mr. J. B. Hatcher was temporarily appointed in December as an assistant to Prof. O. C. Marsh, honorary curator of the department of vertebrate fossils, for the purpose of arranging and classifying the collection which has now been transferred to the Museum.

Mr. Frederick C. Test, a graduate of Indiana State University, was appointed an aid in November, 1890, to assist Dr. Stejneger, in the department of reptiles and batrachians.

There are now thirty-three organized departments and sections in the Museum under the care of curators, including honorary and acting curators, and assistant curators.

LIST OF CURATORS, ASSISTANT CURATORS, AND AIDS.

Arts and Industries: Dr. G. BROWN GOODE, Honorary Curator.
Materia Medica: Dr. JAMES M. FLINT, U. S. Navy, Honorary Curator.
Animal Products: Mr. R. EDWARD EARLL, Acting Curator.
Naval Architecture: Capt. J. W. COLLINS, U. S. Fish Commission, Honorary Curator.
Fisheries: Capt. J. W. COLLINS, U. S. Fish Commission, Honorary Curator.
Foods: Prof. W. O. ATWATER, Department of Agriculture, Honorary Curator.
Historical Collections, Coins and Medals: Mr. A. HOWARD CLARK, Curator.
Transportation and Engineering: Mr. J. E. WATKINS, Curator.
Oriental Antiquities: Prof. PAUL HAUPT, Johns Hopkins University, Honorary Curator; Dr. CYRUS ADLER, Johns Hopkins University, Assistant Curator.
Graphic Arts: Mr. S. R. KOEHLER, Boston Museum of Fine Arts, Acting Curator.
Forestry: Dr. B. E. FERNOW, Department of Agriculture, Honorary Curator.
Physical Apparatus: Mr. W. C. WINLOCK, Honorary Curator.
Ethnology: Prof. OTIS T. MASON, Curator; Mr. WALTER HOUGH, Assistant.
American Prehistoric Pottery: Mr. WILLIAM H. HOLMES, Bureau of Ethnology, Honorary Curator.
Prehistoric Anthropology: Dr. THOMAS WILSON, Curator; Mr. E. P. UPHAM, Assistant.
Mammals: Mr. FREDERICK W. TRUE, Curator.
Birds: Mr. ROBERT RIDGWAY, Curator.
Birds' Eggs: Capt. C. E. BENDIRE, U. S. Army, Honorary Curator.
Reptiles and Batrachians: Dr. LEONARD STEJNEGER, Curator.
Fishes: Dr. TARLETON H. BEAN, U. S. Fish Commission, Honorary Curator; Mr. BARTON A. BEAN, Assistant Curator.
Vertebrate Fossils: Prof. O. C. MARSH, Yale College, Honorary Curator; Mr. FREDERIC A. LUCAS, Assistant Curator.
Mollusks: Mr. WILLIAM H. DALL, U. S. Geological Survey, Honorary Curator; Dr. R. E. C. STEARNS, Adjunct Curator.
Insects: Prof. C. V. RILEY, Department of Agriculture, Honorary Curator; Mr. MARTIN L. LINELL, Aid.
Marine Invertebrates: Mr. RICHARD RATHBUN, U. S. Fish Commission, Honorary Curator; Mr. JAMES E. BENEDICT, Assistant Curator.
Comparative Anatomy: Dr. FRANK BAKER, Honorary Curator; Mr. FREDERIC A. LUCAS, Assistant Curator.
Invertebrate Fossils:
Paleozoic: Mr. C. D. WALCOTT, U. S. Geological Survey, Honorary Curator.
Mesozoic: Dr. C. A. WHITE, U. S. Geological Survey, Honorary Curator.
Cenozoic: Mr. WILLIAM H. DALL, U. S. Geological Survey, Honorary Curator.
Fossil Plants: Mr. LESTER F. WARD, U. S. Geological Survey, Honorary Curator; Mr. F. H. KNOWLTON, Honorary Assistant Curator.
Botany: Dr. GEORGE VASEY, Botanist of the Department of Agriculture, Honorary Curator.
Minerals: Prof. F. W. CLARKE, Chief Chemist, U. S. Geological Survey, Honorary Curator; Mr. WILLIAM S. YEATES, Assistant Curator.
Geology: Mr. GEORGE P. MERRILL, Curator; Mr. W. H. NEWHALL, Aid.

THE ADMINISTRATIVE STAFF.

No changes in the administrative departments have been made during the year. In the office of the assistant secretary, Mr. R. E. Earll, has been engaged on special duty connected with the Smithsonian exhibit for the World's Fair.

The department of accounts and supplies is still under the charge Mr. W. V. Cox, chief clerk. A statement of the work of this depar ment will be found on page 68.

The division of correspondence and reports is under the charge Mr. R. I. Geare. A brief statement relating to the work of this depar ment will be found on page 73.

Mr. S. C. Brown, registrar, is in charge of registration and storag A report of his work will be found on page 35.

Mr. A. Howard Clark has continued his work as editor of "Pr ceedings" and "Bulletin" of the Museum. He also has charge of tl preparation and printing of labels.

The Museum library is under the care of Mr. John Murdoch. detailed statement of its operations for the year will be found c page 42.

The superintendent of the Museum, Mr. Henry Horan, with M Charles A. Steuart as assistant superintendent, continues in charge the mechanics and laborers of the Museum. On page 75 may be foun a statement of the principal items of work performed by the force mechanics and laborers.

LIST OF THE OFFICERS AND EMPLOYÉS OF THE NATIONAL MUSEUM JUNE 30, 1891.

SCIENTIFIC STAFF.

Secretary, Smithsonian Institution,

S. P. LANGLEY.

Assistant Secretary, Smithsonian Institution, in charge of U. S. National Museum,

G. BROWN GOODE.

Curators.

Frederick W. True.
Robert Ridgway.
O. T. Mason.
G. P. Merrill.
Thomas Wilson,
A. Howard Clark.
Leonhard Stejneger.
S. R. Koehler.

Honorary Curators.

W. O. Atwater.
Frank Baker.
T. H. Bean.
Capt. C. E. Bendire, U. S. A.
F. W. Clarke.
J. W. Collins.
W. H. Dall.
Dr. J. M. Flint, U. S. N.
B. E. Fernow.
Paul Haupt.
W. H. Holmes.
O. C. Marsh.
Richard Rathbun.
C. V. Riley.
R. E. C. Stearns.
George Vasey.
C. D. Walcott.
L. F. Ward.
C. A. White.
W. C. Winlock.

Honorary Curators—Continued.

Assistant Curators.

Frederic A. Lucas.
J. E. Benedict.*
W. S. Yeates.
B. A. Bean.

* Temporary.

Aids.

H. Gibb.*
O. A. Peterson.*
M. L. Linell.
Walter Hough.
P. L. Jouy.

Aids—Continued.

C. T. Simpson.
F. C. Test.*
Th. Holm.*
Oscar Hinrichs.*
A. H. Brown.

CLERICAL STAFF.

Chief Clerk.

W. V. Cox.

Chiefs of Divisions.

Randolph I. Geare.
S. C. Brown.
A. Howard Clark.

Engineer of Property.

J. E. Watkins.

Disbursing Clerk.

W. W. Karr.

Finance Clerk.

W. H. Kimball.

Department Clerk.

J. M. Noah.

Assistant Librarian.

N. P. Scudder.

Property Clerk.

J. S. Goldsmith.

Storekeeper.

E. R. Todd.

Document Clerk.

A. R. Sheriff.

Clerks.

E. P. Upham.
C. H. James.
W. H. Newhall.
T. R. Turnbull.
A. F. Adams.
Mrs. H. W. Burnside.
E. E. Whiting.
Miss L. B. Gallaher.
Miss M. L. Stone.
Miss M. J. Rathbun.
Miss Edith Perry.*

Clerks—Continued.

Miss N. H. Smith.*
J. L. Willige.*
Miss M. E. de Ronceray.
Miss S. E. Latham.
Miss S. S. Atkinson.
M. S. Diggs.
W. J. Rhees.
J. S. Sessford.
Miss L. D. Tabler.
Miss M. C. Dyer.*

Draftsmen.

W. H. Chandlee.
W. H. Burger.*

Copyists.

Miss K. A. Gallaher.
Thomas Marron.
H. B. Stimpson.
Miss E. M. Marbury.
Lorraine Tracy.*
Miss C. Rosenbusch.
Mrs. E. C. Montis.*
Mrs. F. E. Malone.*
Miss C. L. Hurlbut.*
Miss Carrie Cornell.*
S. H. Bond.
Miss N. C. Beard.
H. N. Spottswood.*
Miss Alice Macfarland.*
Miss M. A. Yeatman.*

Photographer.

T. W. Smillie.

Artist.

A. Zeno Shindler.

Taxidermists.

Joseph Palmer.
J. W. Scollick.
Henry Marshall.
A. H. Forney.
N. R. Wood.*

* Temporary.

Preparators.

J. C. Proctor.
T. W. Sweeny.
C. R. Luscombe.*
G. C. Neale.

Superintendent.

Henry Horan.

Assistant Superintendent.

C. A. Steuart.

Engineer.

J. H. Parkhurst.

Carpenters and Cabinetmakers.

R. L. Reed.
Henry Bushing.*
W. H. Haney.*
R. W. Ryan.*
C. B. Nichols.*
L. N. Bayne.*
T. P. Deery.*
William Duffy.*
E. G. Harboun.*
E. Thornburg.*

Painters.

C. A. D. Woltz.

Watchmen.

W. M. Ashley.
A. Skinner.
James Gant.
W. H. Brelsford.
J. H. Brown.*
R. A. Calvert.*
J. J. Desmond.
Peter Dunne.
G. W. Field.
C. H. Holmead.
J. E. Hoover.
J. H. Horan.
F. D. Queen.
W. W. Wallingsford.
J. W. Westfall.
J. F. Wilson.*
G. W. Woltz.
J. F. Gatton.*
M. B. Pollock.*

Firemen.

W. E. Beagle.
B. W. Burdine.
J. W. H. Wood.

Skilled Laborers.

R. D. Graham.
G. C. McClain.*
F. I. Offutt.
Mark Mayforth.*
A. B. Thorn.
Joseph Berres.*
Peter Burger.*
W. B. Cooper.
H. C. Taylor.*

Laborers.

John Cahill.
W. F. Bannister.
William Chase.
R. Hill.
John Laws.
B. L. Phillips.
Charles Scott.
George White.
Patrick Ford.
J. T. Harris.
H. E. Harris.
Benjamin Buckner.*
Thornton Dean.*
Isaac Lyles.*
George F. Redman.
T. W. Reese.*
Oliver Roan.*
Frederick Williams.*
J. M. Barrett.*

Messengers.

Paul Brockett.
David Twine.
C. S. Wright.
C. W. Diggs.
A. C. Irvine.*
G. C. Moore.
J. E. Wingate.*

Attendants.

Mrs. M. A. Piper.
Mrs. Harriet Wassem.

Cleaners.

Mrs. Anastasia Coyle.
Mrs. A. V. Hess.
Mrs. M. J. Gregory.
Miss Kate Posey,
Mrs. S. E. Frankland.*
Mrs. Kate Hammersley.*

* Temporary.

F.—REVIEW OF WORK IN THE SCIENTIFIC DEPARTMENTS.

DIVISION OF ANTHROPOLOGY.

ETHNOLOGY.

Progress in this department during the year nas been very satisfactory, under the guidance of Prof. Otis T. Mason, curator. Lieut. T. Dix Bolles, U. S. Navy, was detailed for duty at the museum for five months, and rendered material aid in arranging and cataloguing specimens from Oceanica. Valuable additions to the collection from Oceanica were sent by Admiral Kimberly and Lieut. Safford, U. S. Navy. A card-catalogue of the large collections of religious objects, secured among the pueblos of the southwest by the Bureau of Ethnology, was completed during the year. These collections were labeled by Mrs. Tilly E. Stevenson, and are probably the largest and most complete of any relating to the subject of Pueblo religion. The "artillery" of the American aborigines has been worked up during the year, the linguistic stocks of the aborigines have been fully studied out, and the location of each tribe marked upon a map. An exhibition series of time-keeping apparatus has been commenced, and a complete card-catalogue of the ethnological series was continued during the year. Monographic catalogues, based on the plan of those published by the South Kensington Museum, have also been commenced.

The curator has devoted considerable time to preliminary work in connection with an ethnological exhibit at the World's Columbian Exposition. It is proposed to illustrate in an effective manner the aboriginal life of North America at the time the natives were first visited by the white people, and before they were influenced by contact with our civilization. The number of specimens added to the collection during the year is 1,800. In the catalogue of the department 1,504 entries have been made.

PREHISTORIC ANTHROPOLOGY.

The most important work of the year reported by the curator, Dr. Thomas Wilson, has been the reclassification and rearrangement of the entire collection according to locality. Special researches in many directions have been prosecuted, including the following subjects: Copper implements, jade implements, arrow-heads, casts and models of the Aztec and Maya antiquities. Several important accessions have been received during the year, and are referred to elsewhere in this report. The number of specimens received during the year was 5,504. In the catalogue 934 entries have been made.

GRAPHIC ARTS.

In the section of graphic arts the accessions, while not as numerous as in previous years, have been quite as important. Among the most valuable gifts is a series of specimens fully illustrating the photographic

processes invented by Mr. J. W. Osborne; a collection of Japanese color-prints and illustrated books, received from Mr. T. Tokuno, Tokio, Japan; and an impression from a heliogravure plate made by Nicephon Niepce in 1824. Among the gifts to the collection were also artists' tools and material from F. W. Devoe & Co., New York, and Mr. J. M. Falconer, Brooklyn, N. Y. During the year the cataloguing of the Osborne collection was completed.

The number of catalogue entries made during the year was 1,326, the total number of specimens received being about 1,500, embracing 952 specimens in the Osborne collection received several years ago. The entries representing entirely new material are 374 in number. The Bibliography (Section IV) contains notices of the papers, published by Mr. Koehler during the year.

FORESTRY.

Dr. B. E. Fernow, honorary curator, reports that the forestry collections are being gradually increased by gifts. A systematic display of the more important lumber trees by means of maps, showing their distribution, photographs of typical trees, and photomicrographs of the structure of the wood, has been begun. The most valuable accession during the year was a very complete collection of the woods of the Argentine Republic, donated by the Museo de Productos Argentinos at Buenos Ayres.

AMERICAN PREHISTORIC POTTERY.

Mr. W. H. Holmes, of the U. S. Geological Survey, is in charge of this department. The most important accession during the year was a collection of pottery fragments transmitted by the Bureau of Ethnology. The researches conducted by the curator relate mainly to collections made by the Bureau of Ethnology during the past few years in the Mississippi Valley and along the Alantic Coast. They will be embodied in a forthcoming volume of "Contributions." References are made in the Bibliography (Section IV) to papers published by the curator during the year, relating to excavations in an ancient soapstone quarry in the District of Columbia and to the Thruston Tablet. The catalogue entries for the year were 820 in number.

PHYSICAL APPARATUS.

The nucleus of the collection of physical apparatus consists chiefly of pieces procured by Prof. Henry for researches in electricity and sound. This collection is in charge of Mr. W. C. Winlock, honorary curator. The principal accession is a collection of ancient watch-movements obtained by Mr. S. P. Langley, secretary of the Smithsonian Institution, during a visit to London and Paris in the summer of 1890. A collection of old surveying instruments was received from the surveyor-general of Florida through the General Land Office of the

Department of the Interior. These instruments are supposed to have been used in laying the boundary line between Florida and Georgia in 1795.

HISTORICAL COLLECTIONS.

Mr. A. Howard Clark is in charge of these collections. The most important accessions during the year are the original plaster model of the Statue of Liberty from which was cast the bronze statue surmounting the dome of the Capitol, and a large collection of personal papers and relics of George Washington, including the original will of John Washington. Several historical objects have been submitted for an expression of opinion as to their historical and intrinsic value.

COLLECTION OF DOMESTIC ANIMALS.

The work of mounting typical specimens of domestic animals has been continued by Mr. Nelson R. Wood, 69 specimens being mounted during the year. Nearly all the specimens were difficult subjects, requiring a great deal of time for their preparation. At the close of the year covered by this report, 44 specimens of thoroughbred domestic pigeons and fowls had been collected.

TRANSPORTATION AND ENGINEERING.

These collections, under the custody of Mr. J. E. Watkins, curator, have been materially increased during the year, many valuable accessions having been received. The collection of electrical apparatus has been enriched by the receipt from Miss Mary Henry of the original electro-magnetic engine designed by Prof. Joseph Henry. This machine is one of the earliest applications of magneto-electricity to the production of power. Prof. Henry described its action as "reciprocating motion produced by magnetic attraction and repulsion." Several drawings and lithographs of the original telegraph instrument invented by Mr. Alfred Vail were deposited by his widow, together with two letters, describing Mr. Vail's relations with Prof. Morse and the operations of the first practical electro-magnetic telegraph machine. The Hinds Ketcham Company of Brooklyn, N. Y., deposited a collection of incandescent lamps, switches, and other electric-light apparatus. One of the original cylinders of the "Stourbridge Lion" has been deposited in the Museum, by Lindsay and Early, of Carbondale, Pa.

The ceremonies attending the celebration of the beginning of the second century of the American patent system were held in Washington, on the 8th, 9th, and 10th of April, 1891. Mr. Watkins was appointed secretary of the organization and devoted considerable time to the work of the Congress. During the Patent Centennial a loan collection was installed in the Museum embracing machines of antique design, models, and early patents. Many of the objects forming this collection have found a permanent place in the Museum collections.

The study and exhibition series have also been increased by a large collection of engravings, prints, photographs, and drawings of locomotives, cars, and track-standards, bridges, and many original rail-sections, deposited by Mr. Watkins.

MATERIA MEDICA.

Dr. James N. Flint, U. S. Navy, honorary curator, reports that the work of arranging, installing and providing the specimens with descriptive labels, has been systematically continued. With the exception of the collection of medicines of the North American Indians and Chinese and Japanese drugs, every specimen now has a printed descriptive label. There were 168 specimens received during the year, principally donations from Messrs Powers & Weightman, Philadelphia, and Parke, Davis & Co., of Detroit. Novel and interesting additions were made to the botanical illustrations, consisting of herbarium specimens of indigenous medical plants, not otherwise illustrated. These were prepared by Mr. Theodore Holm, of the Museum staff.

DIVISION OF ZOÖLOGY.

MAMMALS.

Mr. Frederick W. True, curator, reports a gratifying increase in the number of valuable mammals from foreign countries. New storage-cases for the reserve series of alcoholics and small skins have been constructed. Dr. W. L. Abbott presented 76 mammals, collected by him in Africa. Among American mammals the most interesting accession of the year was a male walrus from Walrus Island, Bering Sea, obtained by Capt. W. C. Coulson, of the U. S. Revenue Marine Service. A large sea-lion and numerous specimens of fur-seals, marmots, shrews, and Arctic foxes were obtained during the expeditions of Messrs. H. W. Elliott and William Palmer (of the Museum staff) from the Pribylov Islands. Thirty-two specimens were transferred to the Museum from the Zoölogical Park during the year, including a Rocky Mountain sheep, a bison, black bear and ocelot.

Mr. P. L. Jouy, of the Museum staff, made collections of small mammals in the Roan Mountain region of North Carolina and in southern Arizona. Several groups of mammals have been placed in the exhibition hall during the year, the most conspicuous being a group of East African Guereza monkeys, constructed from skins collected by Dr. W. L. Abbott in the region of Kilima-Njaro, Africa; a group of Borneo gibbons has been prepared, and is now awaiting the construction of a suitable exhibition case. The reconstruction of the south entrance of the Museum building as a storage room and laboratory was completed in September, 1890. Preparations for an exhibit of mammals at the World's Columbian Exposition were begun in March. The force of

taxidermists was increased and a special workshop was fitted up for their use. Mr. William Palmer has been appointed chief taxidermist.

The mammal collections are, on the whole, in a good state of preservation. The number of specimens received during the year was 465.

BIRDS.

The increase in the collections in this department during the year has been most gratifying. The Eighth Congress of the American Ornithologists' Union was held in Washington in November, 1890. The office of the curator of birds—Mr. Robert Ridgway—was used as the headquarters for the members and the meeting-place of several committees, especially that on species and subspecies. Plans and estimates for an exhibit of birds at the World's Columbian Exposition were prepared and submitted by the curator.

The total number of specimens added to the collection during the year was 2,478, and of catalogue entries, 2,383.

Mr. H. Nehrling, of Wisconsin, has published the first part of his work on "North American Birds," many of the illustrations being taken from plates in the reports of the National Museum.

BIRDS' EGGS.

The collection of birds' eggs and nests remains in the custody of Capt. Charles E. Bendire, U. S. Army, honorary curator. Among the more important accessions during the year is an interesting collection of eggs and nests, the gift of Mr. R. MacFarlane, of the Hudson Bay Company. The number of eggs of North American birds in the collection is now 45,031, and of foreign birds, 4,561. The number of nests in the reserve and exhibition series is 2,574, making a total of 52,166 specimens of eggs and nests in the collection.

REPTILES AND BATRACHIANS.

The year covered by this report is reported by Dr. Leonhard Stejneger, curator, as one of unusual activity. The principal accessions received were a collection of reptiles made by Mr. P. L. Jouy, the study of which will probably result in greatly increasing and correcting existing knowledge of the herpetology of the southwestern border; a valuable collection of reptiles from Idaho contributed by Dr. C. Hart Merriam, of the Department of Agriculture. Of the exotic collections none exceed in importance those received from Dr. W. L. Abbott, and collected by him in the Seychelles, Madagascar, and Kilima-Njaro region, East Africa. In addition to his other duties, the curator has assumed the editorship of the supplement to the "Nomenclator Zoölogicus." The titles of papers published during the year by Dr. Stejneger will be found in the Bibliography (section IV, of the report).

During the year 908 specimens have been added to the collection.

FISHES.

Dr. Tarleton H. Bean is still the honorary curator of this department, with Mr. Barton A. Bean as assistant. The number of specimens received during the year is 4,737. Prominent among them is a collection of deep-sea fishes from the Mediterranean Sea, received from the Museum of Natural History in Paris, France. The U. S. Fish Commission has transmitted a collection of fresh-water fishes from Arkansas, Alabama, Georgia, Colorado, and Utah, made by Profs. David S. Jordan, S. E. Meek, C. H. Bollman, and Bert Fessler; a collection containing 16 new species obtained by the steamer *Albatross* from the Pacific coast; a collection made by the *Albatross* in 1887–1888 at Bahia, Patagonia, and the Straits of Magellan, and a collection from Chesapeake Bay made by Messrs. Barton A. Bean and P. Seal.

VERTEBRATE FOSSILS.

This department is in charge of Prof. O. C. Marsh, honorary curator, and Mr. Frederic A. Lucas, assistant curator. Few accessions were received during the year. Twenty-seven specimens were mounted for exhibition. The large and valuable series of western fossils received from Prof. O. C. Marsh is being arranged and classified. The collection now embraces 1,080 specimens, many of them being of great value. A large amount of unclassified material is still in storage.

MOLLUSKS (INCLUDING TERTIARY FOSSILS).

Mr. William H. Dall, of the U. S. Geological Survey, is still in charge of this department, and is assisted in the scientific work by Dr. R. E. C. Stearns, as adjunct curator, and by Mr. Gilbert D. Harris and Mr. Frank Burns, of the U. S. Geological Survey. The general operations of this department have been confined to the determining, labeling, assorting, and registration of specimens, and to the preparation of special reports on collections received from the U. S. Fish Commission, the Navy Department, the Revenue Marine Service, the Department of Agriculture, and from special expeditions. The collection of mollusks in the National Museum now ranks among the most important in the world, especially by reason of the scientific data associated with the material and the thorough system of registration and identification which has been applied to the specimens. Mr. Dall has been largely engaged in preparing a general report on the Neocene formations of the United States. Dr. Stearns has devoted much of his time to an investigation of the mollusks of the Galapagos Islands, and the manuscript is nearly ready for publication.

The amount of material received during the year is considerably greater and more valuable than during last year. An interesting collection of marine shells from Caracas, was presented by Mr. R. L. Bartleman, of the United States legation in Venezuela. The Department of

Agriculture sent land and fresh-water shells gathered by its agents in Arizona. The U. S. Fish Commission contributed several collections from the Pacific coast and from the coast of Labrador.

During the year the entire Lea collection has been registered. The bibliographical notices under the names Dall, Simpson, and Stearns (see Section IV) will indicate the extent and character of the researches made in this department during the year.

About 5,000 specimens were received during the year, making a total of about 465,500 specimens now in the collection. The catalogue entries for the year were 5,764 in number.

INSECTS.

Twelve thousand specimens have been added to the collection during the year. The routine work has been confined to the making up of collections for exchange, the naming of specimens for collections, and the arranging of all the collections in permanent shape. The North American Myriapoda have been rearranged. This collection includes the Bollman collection, which was purchased by the Museum last year, and which ranks as the largest in existence. It contains 160 named species, arranged in 325 alcoholic vials. Among the important accessions of the year are: A collection representing about 63 species of insects of various orders, collected in Angola and St. Thomas, Africa, and presented by Mr. Heli Chatelain, of Washington, D. C.; a large collection of African insects, collected and presented by Dr. W. L. Abbott, Philadelphia, Pa.; 425 specimens of Lepidoptera and 2,400 specimens of Coleoptera collected in California and Washington by Mr. A. Koebele, and received from the Department of Agriculture; 1,100 specimens, representing 240 species of North American Microlepidoptera, also transmitted by the Department of Agriculture. The number of catalogue entries for the year was 174. The collections are in a very satisfactory condition.

MARINE INVERTEBRATES.

Favorable progress is reported in the work of this department by the honorary curator, Mr. Richard Rathbun. The construction of a new roof over the west hall of the Smithsonian Institution has necessitated the temporary removal of the greater part of the collection stored there. The number of specimens has been considerably increased by additions from various sources. The work of the department has been actively carried on by Mr. James E. Benedict, assistant curator, and Miss M. J. Rathbun. Mr. Benedict accompanied the U. S. Fish Commission steamer *Fish Hawk* for three months, while making surveys of oyster-beds in Long Island Sound and on the coast of North Carolina. The number of accessions recorded was 32, embracing 6,750 specimens. The contributions made by the Fish Commission included 56 species of Brachyurans and Anomourans, dredged by the Fish Commission

steamer *Albatross*, chiefly in the Pacific Ocean; a collection of Brachyurans, obtained by the U. S. Fish Commission schooner *Grampus*, from the Gulf of Mexico; a large series of specimens of the genus *Panopeus*. Large and valuable collections were also received from the British Museum, London; the Imperial Museum of Natural History, Berlin; the Royal Zoölogical Museum, Copenhagen; Dr. E. A. Andrews, of Johns Hopkins University, Baltimore, Md.; and Prof. H. A. Ward, Rochester, N. Y. Several sets of duplicate specimens for exchange and for distribution to educational establishments were prepared and sent out. Mr. Benedict, assisted by Miss Rathbun, has continued his studies upon the Brachyurans and Anomourans. This collection is one of the largest and most important of the kind that has ever been brought together. It represents all parts of the world, and is especially rich in forms from the coasts of the United States.

COMPARATIVE ANATOMY.

The curatorship of this department has been transferred to Dr. Frank Baker, who, owing to the duties of his position as acting manager of the National Zoölogical Park, is at present unable to devote any time to its work. The management of the affairs of the department has therefore devolved upon Mr. Frederic A. Lucas, assistant curator. A considerable portion of his time has been devoted to the preparation of a plan for a synoptic exhibition series of invertebrates. The mounting and installation of specimens has also been pushed forward. He has made a study of the osteology of the family *Paridæ* and some of its allies. Mr. Lucas has also studied the osteological and other anatomical characters of the *Trochilidæ*, and the results are incorporated with the paper on Humming birds, prepared by Mr. Ridgway, curator of birds, and published in the Museum report for 1890.*

The most important accessions during the year were a small collection of North Bornean birds, and a collection of birds from the Pribylov Islands.

During the year 655 specimens were added to the collection.

FOSSILS (PALEOZOIC).

From the report of Mr. C. D. Walcott, honorary curator, the year's work shows much progress, both in the development of the collection and the installation and labeling of specimens. A large amount of material has been received from the U. S. Geological Survey. Two important accessions were obtained during the year from the Geological Survey of Sweden, and from Mr. Thomas Ruddy, of Wales. The latter collection is from the Bala series of rocks. The number of entries during the year was 215, comprising 615 specimens. Notices of the papers published during the year by the curator and others attached to this department, and based upon Museum material, will be found in the Bibliography (Section IV).

* Pages 253-383.

INVERTEBRATE FOSSILS (MESOZOIC).

Dr. C. A. White, of the U. S. Geological Survey, is still in charge of this department as honorary curator. His connection with the Survey renders it impossible for him to devote much of his time to Museum work. The collection of this department is steadily increasing, and is now in better condition for examination and study than hitherto. It has not yet been found practicable to separate the specimens into reserve, duplicate, and exhibition series.

During the year, 1488 entries, embracing 8,449 specimens, have been made in the catalogue.

DIVISION OF BOTANY.

FOSSIL PLANTS.

Prof. Lester F. Ward, of the U. S. Geological Survey, continues to act as honorary curator of this department. He states that the work of the year has been chiefly confined to the installation and care of specimens, the collection being now in excellent condition for study. The most important accessions are a collection of Dakota plants, sent by Prof. F. H. Snow, of the University of Kansas, and the collection given by Capt. Charles E. Bendire, comprising 700 specimens. Mr. David White, assistant, has been engaged in work on the carboniferous plant collections and in preparing a bibliography of paleobotany. Mr. Charles S. Prosser has devoted his time largely to the preparation of a paleo-botanical species index. Mr. F. H. Knowlton, assistant curator, made collections of fossil wood and plant-remains in the Gallatin Valley, Montana. He has also continued his studies on fossil wood, and has in preparation a paper on paleozoic woods. Prof. William M. Fontaine, of the University of Virginia, has completed his studies of the Potomac flora.

RECENT PLANTS.

There has been considerable growth in this department during the year, the number of mounted sheets added to the National Herbarium being 50 per cent more than during last year. Dr. George Vasey, Botanist of the Department of Agriculture, continues his valuable services as honorary curator of the National Herbarium. Dr. Vasey has been assisted by Mr. Fred. Coville, who has made many valuable collections in the field, and has also materially aided in the work of arranging and classifying specimens. The accessions received during the year number 622, including a most valuable collection of 10,000 specimens gathered by Edward Palmer in western Mexico, from the States of Sonora and Colima; a collection of 1,740 specimens from the Death Valley region of California, from Arizona, and Nevada, obtained by Mr. Coville and Mr. Frank Funston; a large collection of mosses and

hepaticæ, numbering over 2,000 specimens, from Dr. L. M. Underwood, and a collection of 2,318 plants from Minnesota, transmitted by Dr. G. H. Sandberg. The total number of plants received during the year from all sources was 40,963. This number, added to 39,654, which represents the total number of specimens received in the Museum up to June 30, 1890, gives the total number of plants now in the National Museum. The number of specimens mounted and added to the collections during the year is 8,945, and the number of specimens distributed 8,059. A list of the botanical papers published by the curator and by other collaborators will be found in Section IV of this report.

DIVISION OF GEOLOGY.

MINERALS.

The growth of this department, under the honorary curatorship of Prof. F. W. Clarke, chief chemist of the U. S. Geological Survey, has been satisfactory, although no very large additions were made to the collections. The routine work of cataloguing and labeling specimens occupied much of the time of the assistant curator, Mr. W. S. Yeates. A nearly complete rearrangement of the systematic exhibition series was carried out. Only three accessions of great importance have been received, namely, 171 Russian minerals presented by Mrs. Mary I. Stroud; 53 Freiberg minerals received in exchange from the Royal Saxon Mining School; and a superb series of specimens from the Broken Hill mines, in Australia, given by Mr. Walter J. Koehler, and embracing specimens of native copper, native silver, cerussite, cerargyrite, dyscrasite, and chrysocolla. The gem collection of the late Prof. Joseph Leidy, containing about 400 cut stones, was purchased for use in connection with the proposed exhibit of the Museum at the World's Columbian Exposition. The number of entries made during the year was 1,132, including 7,315 specimens.

GEOLOGY.

Work in the department of geology has been largely confined to the economic section, and a rearrangement and classification of the material. The contributions of Mr. J. H. Huntington, Hyde Park, Mass.; Mr. F. W. Crosby, Washington, and Mr. J. P. Iddings, U. S. Geological Survey, were among the most important of those received during the year. A large lot of onyx marble from the newly discovered deposit near Prescott, Ariz., was received from Mr. William O'Neil.

A special feature of the work of this department consists in the identification of specimens sent for examination and report, no less than 132 lots of specimens having been assigned to this department for this purpose during the year.

A change in the method of installation was effected during the year by the introduction of bent-wire brackets, the specimens being inclined at an angle of 60 or 80 degrees.

Owing to the pressure of routine work no special researches have been undertaken by the curator. References to the papers published during the year relating to this department will be found in Section IV of this report. The collections have been frequently consulted by students, and in certain instances material was lent for study.

G.—REVIEW OF THE ADMINISTRATIVE WORK.

REGISTRATION AND STORAGE.

The registrar, Mr. S. C. Brown, has submitted a carefully prepared report of the work accomplished in this department. The total number of incoming packages of all kinds during the year is 33,686, constituting 2,841 entries on the transportation record of incoming packages. Of this number 572 contained specimens for the National Museum, the remainder being intended for the Institution, the Bureau of International Exchanges, the National Zoölogical Park, and the National Museum. The record of outgoing packages for the year has taken up 1,025 entries, embracing 1,967 packages of various kinds. The accession record for the year shows 1,187 entries, in addition to 452 lots of specimens transmitted for examination and report. The index to the lists of specimens sent for "examination and report," and the "department" index to the accession list in Section V of this report, show the disposition of the accessions among the departments of the Museum.

The distribution of ethnological, geological, zoölogical, and other educational institutions has been continued as far as practicable, and 130 educational establishments at home and abroad have been supplied with duplicates from the collections. Numerous exchanges of specimens have been completed. Many applications for mineral and geological specimens still remain unfilled. Duplicate collections of birds' skins, fishes, and rocks are now being prepared for distribution.

The following statement indicates by geographical arrangement the recipients of the duplicate specimens and the character of the material distributed.

GEOGRAPHICAL STATEMENT OF THE DISTRIBUTION OF SPECIMENS DURING THE YEAR ENDING JUNE 30, 1891.

FOREIGN COUNTRIES.

AFRICA.

J. H. Brady, Cape Town: Insects (208 specimens) in exchange. (D.* 6632.)

AUSTRALIA.

Auckland Museum, Auckland, New Zealand: Minerals (71 specimens); mammals (16 specimens); reptiles (14 specimens); birds' skins (10 specimens) in exchange. (D. 6600.)

* "D" refers to the distribution record kept in the registrar's office.

Australian Museum, Sydney, New South Wales: Skin and skull of *Antilocapra americana;* skull of *Bison americanus,* and dried skin of *Lepidosteus osseus* for exchange. (D. 6450.)

AUSTRIA.

Natural History Museum, Vienna: Duplicate marine invertebrates (set 6, London series). (D. 6367.)

CANADA.

University of New Brunswick, Fredericton, New Brunswick: Stone implements (26 specimens); fragments of pottery (6 specimens) in exchange. (D. 6500.)

CENTRAL AMERICA.

National Museum, San José, Costa Rica: Birds' skins (30 specimens) in exchange. (D. 6706.)

ENGLAND.

Henry Balfour, Oxford: Fire-drills (3 models); blow-gun, model of fire-drill, and pottery lamp in exchange. (D. 6366.) (D. 6639.) 5 pieces of Pueblo Indian pottery in exchange. (D. 6691.)

Prof. George S. Brady, Sunderland: Echinoderms and corals (39 specimens) in exchange. (D. 6714.)

British Museum, London: Duplicate marine invertebrates (set 1, London series); ethnological material (one box and 75 specimens) in exchange. (D. 6368.) (D. 6441.) (D. 6638.)

Isaac Earnshaw, Oldham: Fossil plants (22 specimens) in exchange. (D. 6725.)

Hugh Fulton, London: *Voluta stearnsii* (4 specimens) in exchange. (D. 6667.)

Edward Lovett, Croydon: Ethnological material (1 box) for exchange. (D. 6442.)

Mason Scientific College, Birmingham: Graptolites for exchange. (D. 6440.)

Royal Gardens, Kew: Ethnological material (11 specimens) for exchange. (D. 6640.)

FRANCE.

Museum at Chalon-sur-Saône: Stone implements (56 specimens); fragments of pottery (50 specimens) in exchange. (D. 6621.)

Museum of Natural History, Paris: Skeleton of *Bison americanus* and 4 birds' skeletons in exchange. (D. 6679.)

GERMANY.

R. Forrer, Strassburg: Specimen of textile from a grave. Gift. (D. 6533.)

Prof. P. Groth, Munich: Rocks (4 specimens in exchange). (D. 6407.)

Royal Saxon Mining Academy, Freiburg, Saxony: Minerals (47 specimens) for exchange. (D. 6423.)

B. Sturtz, Bonn, Prussia: Rocks (93 specimens); rocks (175 specimens) in exchange. (D. 6490.) (D. 6738.)

University of Munich, Munich, Bavaria: Minerals (2 specimens) in exchange. (D. 6776.)

Dr. H. Von Ihering, Hamburg: American Unios (186 specimens) in exchange. (D. 6778.)

Zoölogical Museum, Berlin: Echinoderms (158 specimens) in exchange. (D. 6617.)

ITALY.

H. J. Johnston-Lavis, Naples: Rocks (64 specimens); minerals (18 specimens) in exchange. (D. 6612.) (D. 6625.)

RUSSIA.

A. Lösch, St. Petersburg: Specimen of platiniferous polydimite in exchange. (D. 6422.)

SWEDEN.

Prof. T. M. Fries, Upsala: Dried plants (800 specimens) in exchange. (D. 6487.)
Royal Swedish Academy, Stockholm: Dried ferns from the United States and Costa Rica (100 species) in exchange. (D. 6505.)

UNITED STATES.

ALABAMA. Blount College, Blountsville: Duplicate collection of minerals (set 97). Gift. (D. 6745.)
Jefferson Academy, Jefferson: Duplicate collection of minerals (set 73). Gift. (D. 6461.)

ARKANSAS. Charles F. Brown, Hot Springs: Amazonstone (200 specimens) for exchange. (D. 6568.)

CALIFORNIA. Charles R. Orcutt, San Diego: Reptiles (2 specimens) in exchange. (D. 6526.)

CONNECTICUT. High School, Stamford: Duplicate collection of minerals (set 75). Gift. (D. 6476.)
Oliver T. Hyde, Ellington: Minerals (20 specimens). Gift. (D. 6733.)
Prof. William North Rice, Middletown: Rocks (5 specimens) in exchange. (D. 6771.)
Yale College Museum, New Haven: Minerals (8 specimens). Gift. (D. 6408.)

DISTRICT OF COLUMBIA. Prof. Cleveland Abbe, Washington: Slab of crocidolite quartz from South Africa, in exchange. (D. 6708.)
Catholic University, Washington: Cast of Assyrian obelisk, in exchange. (D. 6488.)
Chevalier Schmit Von Tavera, Austria-Hungary Legation, Washington: Catlinite pipe. Gift. (6482.)
Mount Vernon Seminary, Washington: Duplicate marine invertebrates (series IV, set 173, and special set as a gift). (D. 6475.)
National Zoölogical Park, Washington: Living snake (Accession 23337). Gift. (D. 6369.)
I. C. Russell, Washington: Specimen of thinolite. Gift. (D. 6519.)
Mrs. H. B. Walcott, Washington: Zuñi pottery (4 specimens) in exchange. (D. 6575.)
Washington High School, Washington: Duplicate collection of minerals (set 85). Gift. (D. 6584.)

ILLINOIS. Kenwood Physical Observatory, Chicago: Fragments of five meteorites. Gift. (D. 6530.)
Prof. J. A. Udden, Rock Island: Volcanic dust (6 samples) in exchange. (D. 6694.)

INDIANA. Charles S. Beachler, Crawfordsville: Echinoderms (97 specimens) in exchange. (D. 6607.)
High School, Winamac: Duplicate collection of minerals (set 88). Gift. (D. 6622.)
Indiana Normal University, Evansville: Duplicate collection of minerals (set 71). Gift. (D. 6455.)
John W. Spencer, Paxton: Duplicate set of marine invertebrates (special set) in exchange. (D. 6402.)

IOWA. Hamburg Public Schools, Hamburg: Duplicate collection of minerals (set 81). Gift. (D. 6570.)

Parsons College, Fairfield: Duplicate collection of minerals (set 91). Gift. (D. 6629.)

Saint Mary's Academy, McGregor: Duplicate collection of minerals (set 69). Gift. (D. 6433.)

KANSAS. Hartford School, Hartford: Duplicate collection of minerals (set 74). Gift. (D. 6463.)

Hiawatha Academy, Hiawatha: Duplicate collection of minerals (set 92). Gift. (D. 6364.)

LOUISIANA. W. H. Jack, Baton Rouge: Specimen of gold on schist for exchange. (D. 6541.)

Gustave Kohn, New Orleans: Salamanders (4 specimens); salamanders (2 specimens) in exchange. (D. 6605). (D. 6630.) (D. 6729.)

The Louisiana State University, Baton Rouge: Duplicate marine invertebrates (series IV, set 177). Gift. (D. 6589).

MAINE. High School, Bridgton: Duplicate collection of marine invertebrates (series IV, set 174). Gift. (D. 6477.)

Loren B. Merrill, Paris: Specimen of silver-lead ore; rocks and ores (11 specimens) in exchange. (D. 6507.) (D. 6611.)

L. H. Merrill, Orono: Specimen of phonolite in exchange. (D. 6540.)

MARYLAND. Baltimore City College, Baltimore: Duplicate collection of minerals (set 79). Gift. (D. 6495.)

Baltimore Manual Training School, Baltimore: Duplicate collection of minerals (set 56). Gift. (D. 6373.)

Loyola College, Baltimore: Duplicate collection of minerals (set 87). Gift. (D. 6597.)

Frank T. Redwood, Baltimore: Ethnological material (2 specimens); executioner's knife from Africa in exchange. (D. 6464.) (D. 6497.)

MASSACHUSETTS. William Brewster, Cambridge: Birds' skins (17 specimens). Gift. (D. 6517.)

Charles B. Cory, Boston: Birds' skins (17 specimens) in exchange. (D. 6518.)

Harvard University, Cambridge: Cast of the Grand Rapids meteorite. Gift. (D. 6712.)

High School, Springfield: Duplicate collection of marine invertebrates (series IV, set 179). Gift. (D. 6727.)

Peabody Academy of Science, Salem: Specimen of Japanese screen in exchange. (D. 6732.)

MICHIGAN. Albion College, Albion: Duplicate collection of minerals (set 57). Gift. (D. 6376.)

Battle Creek College, Battle Creek: Duplicate collection of minerals (set 61). Gift. (D. 6388.)

Detroit College, Detroit: Duplicate collection of minerals (set 62). Gift. (D. 6390.)

Kalamazoo College, Kalamazoo: Duplicate collection of minerals (set 76). Gift. (D. 6383.)

Parke, Davis & Co., Detroit: Casts of Easter Island tablets in exchange. (D. 6740.)

MINNESOTA. Moorhead Normal School, Moorhead: Duplicate collection of minerals (set 66). Gift. (D. 6401.)

MISSOURI. Maryville Seminary, Maryville: Duplicate collection of minerals (set 95). Gift. (D. 6724.)

Missouri Valley College, Marshall: Duplicate collection of minerals (set 80), and collection of marine invertebrates (series IV, set 175). Gift. (D. 6547.)

Missouri Wesleyan Institute, Cameron: Duplicate collection of minerals (set 68). Gift. (D. 6432.)

MONTANA. Johan B. Koch. Bozeman: Arrow and spear-points (50 specimens) in exchange. (D. 6496.)

NEBRASKA. Chatauqua Museum, Long Pine: Duplicate collection of minerals (set 65). Gift. (D. 6400.)

Nebraska Wesleyan University, Lincoln: Duplicate collection of minerals (set 60). Gift. (D. 6387.)

The High School, Beatrice: Duplicate collection of minerals (set 90). Gift. (D. 6628.)

NEW HAMPSHIRE. Dartmouth College, Hanover: Lay figure in exchange. (D. 6767.)

NEW JERSEY. R. T. Tracy, Camden: Porcelain clays (10 specimens) in exchange. (D. 6696.)

NEW YORK. American Museum of Natural History, New York City: Four skins and skull of *Tamias;* birds' skins (26 specimens) in exchange; Crinoids (4 species). Gift. (D. 6395.) (D. 6524.) D. 6713.)

Hon. E. G. Blackford, New York City: Framed photograph of American bison. Gift. (D. 6374.)

Brockport State Normal School, Brockport: Duplicate collection of minerals (set 70). Gift. (D. 6454.)

Brooklyn Institute, Brooklyn: Specimen of *Pentacrinus decorus.* Gift. (D. 6565.)

Brooklyn Training School, Brooklyn: Duplicate collection of marine invertebrates (series IV, set 172). Gift. (D. 6416.)

Brooklyn, Pratt Institute: Collection of photographs. Gift. (D. 6739.)

Columbia College, New York City: Photo-mechanical process work (86 specimens) in exchange. (D. 6506.) Duplicate collection of marine invertebrates (series IV, set 176). Gift. (D. 6548.)

George L. English & Co., New York City: Minerals (box) in exchange. (D. 6779.)

J. Scott Hartley, New York City: 12 casts of Indian heads in exchange. (D. 6535.)

Homer Academy, Homer: Duplicate collection of minerals (set 82). Gift. (D. 6577.)

F. Irsch, New York City: Specimen of bowstring hemp: Pita (2 specimens); and flax (3 specimens); in exchange. (D. 6438.)

New York State Museum, Albany: Ornamental stones (7 specimens) in exchange. (D. 6521.)

Charles Palm, New York City: Dry specimens of coleoptera in exchange. (D. 6546.)

Phelps Union School, Phelps: Duplicate collection of minerals (set 63). Gift. (D. 6396.)

Rochester Free Academy, Rochester: Duplicate collection of minerals (set 67). Gift. (D. 6431.)

Rochester, Henry A. Ward: Specimen of breastbone of *Rhytina*, restored (gift); large specimen of sponge collected off Cape Hatteras (exchange). (D. 6601.) (D. 6552.)

Rushville Union School, Rushville: Duplicate collection of minerals (set 64). Gift. (D. 6397.)

St. John's Rectory, Syracuse: Minerals (27 specimens). Gift. (D. 6561.)

M. F. Savage, New York City: Fijian club and Sandwich Island Fly-flapper in exchange. (D. 6493.)

School of Mines, Columbia College, New York city: Dumortierite in quartz (8 specimens) for exchange. (D. 6516.)

Skaneateles Free Library, Skaneateles: Duplicate collection of minerals (set 84). Gift. (D. 6579.)

State Normal and Training School, Cortland: Duplicate collection of minerals (set 83). Gift. (D. 6578.)

Staten Island Academy and Latin School, Stapleton: Duplicate collection of minerals (set 86). Gift. (D. 6596.)

The Franciscan Convent, Syracuse: Minerals (28 specimens). Gift. (D. 6580.)

The Francis Hatch Library, Cortland: Minerals (28 specimens). Gift. (D. 6581.)

NEW YORK. Rev. H. H. Thomas, Dansville: Minerals (50 specimens) in exchange. (D. 6514.)

Union Free School, Canandaigua: Duplicate collection of minerals (set 58). Gift. (D. 6378.)

OHIO. W. S. Burt, Youngstown: Arrow and spear-points (50 specimens) in exchange. (D. 6499.)

W. H. McGinnis, Youngstown: Arrow-points (5 specimens) in exchange. (D. 6720.)

Oberlin College, Oberlin: Specimen of bird skin in exchange. (D. 6458).

Ohio State University, Columbus: Duplicate collection of minerals (set 77). Gift. (D. 6439.)

PENNSYLVANIA. Oscar A. Burdats, Philadelphia: Specimen of Lancelet (*Amphioxus lanceolatus*). Gift. (D. 6512.)

Pennsylvania State College, State College: Duplicate marine and fresh-water fishes (90 species), and duplicate set of minerals (set 89). Gift. (D. 6627.)

W. W. Rockhill, Philadelphia: Ethnological material (3 specimens) in exchange. (D. 6766.)

Dr. C. M. Stubbs, Wakefield: Arrow and spear-heads (50 specimens) in exchange. (D. 6606.)

University of Pittsburgh, Pittsburgh: Duplicate collection of minerals (set 59). Gift. (D. 6386.)

Warren Public Academy, Warren: Duplicate collection of minerals (set 98). Gift. (D. 6751.)

SOUTH CAROLINA. Prof. H. A. Green, Chester: Minerals and ores (14 specimens) in exchange. (D. 6662.)

TENNESSEE. Ridgedale Public School, Ridgedale: Duplicate collection of minerals (set 94). Gift. (D. 6652.)

TEXAS. Fort Worth University, Fort Worth: Duplicate collection of minerals (set 72). Gift. (D. 6456.)

WEST VIRGINIA. Allegany Collegiate Institute, Alderson: Duplicate collection of minerals (set 78). Gift. (D. 6491.)

WISCONSIN. William H. Hobbs, Madison: Rocks (44 specimens) in exchange. (D. 6471.)

High School Museum, Sparta: Duplicate collection of minerals (set 96). Gift. (D. 6731.)

State Normal School, Milwaukee: Duplicate marine invertebrates (series IV, set 178). Gift. (D. 6651.)

University of Wisconsin, Madison: Minerals (71 specimens) as exchange. (D. 6515.)

WYOMING. Wyoming University, Laramie: Duplicate collection of minerals (set 93). Gift. (D. 6637.)

The following table shows the number of specimens distributed from the various departments in the Museum during the year ending June 30, 1891:

Department.	No. of specimens.	Department.	No. of specimens.
Physical apparatus	20	Fishes	90
Graphic arts	86	Mollusks	190
Ethnology	138	Insects*	2,144
Pottery	9	Marine invertebrates	1,700
Prehistoric anthropology	293	Fossil plants	8,059
Mammals	21	Minerals	493
Birds	163	Geology	459
Birds' eggs and nests	2	Total	13,875
Reptiles and batrachians	14		

* Of this number 1,239 were sent to specialists for study.

In the report for last year (1889–'90) a tabulated statement, similar in character to the preceding table, was inadvertently omitted, and is therefore inserted in this place:

Department.	No. of specimens distributed 1889–'90.	Department.	No. of specimens distributed 1889–'90.
Oriental antiquities	93	Insects	295
Ethnology	340	Marine invertebrates	690
Pottery	9	Paleozoic fossils	12
Prehistoric anthropology	55	Mesozoic fossils	13
Mammals	23	Recent plants	7,951
Birds	589	Minerals	4,430
Reptiles and batrachians	34	Geology	200
Fishes	28	Total	14,874
Mollusks	104		

The registrar has completed an alphabetical index of the distributions since 1874, which includes more than 6,700 shipments. A card catalogue, arranged by names of recipients, has also been prepared, showing the distributions of specimens made to each museum, college or individual. This catalogue is very useful, showing at a glance the relations of this kind which have existed between the National Museum and the establishments referred to on the cards. The file containing the papers relating to the distribution of specimens has been amplified and improved, and is now in excellent condition for reference.

It may be interesting to compare the total amount of distributions made during the decade ending in 1880 with the total for the decade completed last year. These figures are given in the following table, showing an increase of about 60 per cent in favor of the more recent decade:

Total numbers of specimens distributed during the decades 1871 to 1880 and 1881 to 1890, respectively.

DISTRIBUTION OF DUPLICATES.

Year.	No. of specimens.	Year.	No. of specimens.
1871	10,139	1881	13,293
1872	9,880	1882	12,391
1873	15,720	1883	16,270
1874	28,849	1884	21,084
1875	4,883	1885	15,000
1876		1886	23,987
1877	9,754	1887	*11,000
1878	6,426	1888	29,408
1879	8,966	1889	*11,382
1880	14,679	1890	14,874
Total	109,296	Total	168,089

*The decrease in the number of specimens distributed during this year is due to the constantly increasing pressure of routine work in the scientific departments and to the inability of the curators to complete the separation of the duplicates for distribution.

LIBRARY.

Mr. John Murdoch, librarian, furnishes the following information regarding the operations of the library during the year:

The total number of publications added to the library during the year was 12,854 (922 volumes of more than 100 pages, 2,492 pamphlets, 9,280 parts of regular serials, and 160 charts). Of these, 424 volumes, 883 pamphlets, and 6,413 parts of serials were retained for the use of the Museum from the accessions of the Smithsonian Institution. The remainder were obtained by gift, exchange, and purchase.

The largest gift to the library during the year was from the Rev. John Croumbie Brown, of Haddington, Scotland, and consisted of the professional library of his late brother, Dr. Samuel Brown. Dr. Brown, who has been called "the last of the alchemists," was born in Scotland in 1817. He devoted himself at an early age to the study of chemistry. His attention was especially attracted to the ultimate problems of the science, and he became persuaded that the elements usually regarded as chemically simple and primary were transmutable into each other. He was a poet and essayist as well as a chemist, but his time was chiefly spent in his laboratory, and at the time of his death, in 1856, he believed that he was very near to the point of demonstrating the great fundamental theory, in which his own faith had never wavered. His library, consisting of 150 volumes and 8 pamphlets, contains many rare and valuable old works on chemistry and physics, and will be kept by itself in the library under the name of the "Samuel Brown Collection."

An important donation was received from Dr. Charles A. White, U. S. Geological Survey, honorary curator of the section of mesozoic fossils, consisting of 106 volumes, 82 parts, 50 pamphlets, and 5 maps.

The work of entering and cataloguing the Rau Memorial Library has at last been completed. This collection, as finally catalogued, comprises 1,609 titles.

An excellent beginning has been made on the much-needed subject catalogue. This now consists of 1,838 cards, arranged according to the decimal classification in general use among libraries.

Three new sectional libraries have been added to the list during the year, namely: Aëronautics (authorized by order of the secretary, June 19), in charge of Mr. G. E. Curtis; astronomy, in charge of Mr. W. C. Winlock; and reptiles and batrachians, in charge of Dr. Leonhard Stejneger.

The number of books assigned to the sectional libraries is as follows:

Administration.—203 volumes. 6 parts, 58 pamphlets, and 1 chart.
Aëronautics.—(Now being organized.)
Astronomy.—9 volumes, 580 parts, 3 pamphlets.
Birds.—534 volumes, 252 parts, 49 pamphlets, 5 charts.
Editor.—628 volumes, 538 parts, 46 pamphlets.
Ethnology.—347 volumes, 201 parts, 16 pamphlets, and 1 chart.
Fishes.—87 volumes, 24 parts, 8 pamphlets.
Geology.—522 volumes, 547 parts, 365 pamphlets, and 48 charts.

Insects.—430 volumes, 907 parts, 217 pamphlets.
Mammals.—204 volumes, 310 pamphlets.
Marine Invertebrates.—7 volumes, 44 pamphlets, 118 charts.
Materia medica.—223 volumes, 215 parts, 18 pamphlets.
Mesozoic fossils.—31 volumes, 2 pamphlets.
Mineralogy, A.—183 volumes, 418 parts, 8 pamphlets.
Mineralogy, B.—74 volumes, 69 pamphlets, 1 sheet.
Mollusks and Cenozoic fossils.—105 volumes, 274 parts, 93 pamphlets.
Oriental archæology.—190 volumes, 398 parts, 112 pamphlets.
Plants, recent and fossil.—331 volumes, 1,437 parts, 261 pamphlets.
Prehistoric anthropology.—62 volumes, 80 parts, and 24 pamphlets, in addition to the Rau Memorial Library of 1,609 titles.
Reptiles and batrachians.—9 volumes, 51 parts, 1 pamphlet. (Partly organized.)
Transportation and engineering.—84 volumes, 438 parts, 4 pamphlets.

It was hoped that Congress would provide for binding the accumulated books belonging to the Museum library, but the appropriation asked for was not granted. The usual application was therefore made to Mr. Spofford, Librarian of Congress, for an order to bind some of the books belonging to the Smithsonian deposit now in use at the Museum, and Mr. Spofford with his usual kindness at once furnished an order for binding 300 volumes. By taking advantage of a time of the year when work at the Government bindery was least pressing, it was possible to have these books away from the library a comparatively short time only.

Mr. N. P. Scudder has made great improvement in the condition of the crowded periodical room. The construction of 480 feet of shelving has enabled him to arrange the books in much more accessible shape, and also to adopt something in the way of a classification, making the finding of periodicals much more convenient than formerly. Nevertheless, the rate of growth of the library is so large that the value of this additional shelf-room is almost neutralized by the greater number of accessions during the year.

SPECIMENS SENT TO THE MUSEUM FOR EXAMINATION AND REPORT* DURING THE YEAR.

A large number of specimens are received every year for examination and report. A record is kept of each package, and when the specimens are considered worthy of addition to the Museum collections, they are so recorded and given an accession number. About 450 lots (797–1247) have been received for examination and report during the fiscal year covered by this report. The specimens are examined by the curator in charge of the department to which they relate, and he submits a statement regarding them, which is forwarded to the sender, or used in preparing a reply. A list is given below:

ACADEMY OF NATURAL SCIENCES, Philadelphia, Pa.: Two specimens of snakes. (Returned.) 1242 (VI).

* The first number in the items included in this list relates to the record of specimens sent for examination and report. The number in parentheses relates to the record of permanent accessions. The third, in roman, and also in parentheses, relates to the department in the Museum to which the specimen was referred.

ADAMS, C. F., Champaign, Ill.: Group of shrikes. (Purchased.) 885 (23622) (V, A).

ALDERSON, W. J., Hartmonsville, W. Va.: Specimen of impure limestone. 1107 (XVII).

ALEXANDRIA FERTILIZER COMPANY, Alexandria, Va.: Specimen of mineral. 989 (XVI).

ALLAN, JAMES M., Chicago, Ill.: Specimen of mineral. 909 (XVI).

ALLEN, H. C., Buckley, Wash.: Specimen of ore from Stark Mine. 1031 (XVII).

ALPINE PLASTER AND CEMENT COMPANY, Los Angeles, Cal.: Samples of calcareous sand. 921 (XVII).

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.: Two skins of *Ammodramus sandwichensis alaudinus*, from British Colombia. (Returned.) 868 (V, A); eleven specimens of Humming birds sent for identification. (Returned.) 944 (V, A).

ANGEL, L. C., Ridge Spring, S. C.: Two specimens of minerals from South Carolina. 915 (XVI).

ANTHONY, A. W., San Diego, Cal.: Six specimens, representing five species, of birds from Lower California, California, and Oregon. (Returned.) 861 (V, A); five specimens of an unnamed form of *Junco*, from Mount Wilson, Los Angeles County, Cal. (Returned.) 912 (V, A); specimens of *Passerculus*. (Returned.) 945 (V, A).

ANTHONY, T. O. T., Norborne, Mo.: Specimen of insect. 1245 (X).

APPLETON, JOHN W. M., Salt Sulphur Springs, W. Va.: Specimens of mineral. 963 (XVI).

ATKINSON, Hon. G. W. (See under P. V. Reynolds and J. S. Wilson.)

AUSTIN, GEORGE, Nashville, Kans.: Specimen of moth. 1177 (X).

BACKUS, E., Mexico, Mexico: Specimen of mineral. 1226 (XVI).

BAGSTER, C. B., Vineland, N. J.: Specimen of insect which injures cabbages in Florida. 1175 (X).

BAILEY, THOMAS P., Springfield, Mo.: Specimens of minerals. 896, 923 (XVI).

BAKER, M. A., Weston, Oregon: Specimen taken from a well, about 30 feet deep, near Weston. 913 (XVII).

BALDWIN, H. O., New Waterford, Ohio. Insect. 1216 (X).

BALL, WILBER W., La Salle, Ill. Specimens of fibers of burdock. 819 (I).

BALLARD, LEWIS, Lindside W. Va.: Specimens of ores. 1221 (XVII).

BANTA, W. H., Valparaiso, Ind.: Stone relics. 1096 (III).

BARBER, A. W., Tallahassee, Fla.: Specimen of supposed lava from Wakulla Volcano. 798 (XVII).

BARKER, JOHN W., Washington, D. C.: Specimens of granite. 824 (XVII).

BARNARD, G. W., Phœnix, Ariz.: Fossil teeth and lower jaw sent for determination of species. 852 (XII).

BARNETT, W. J. B., Nogales, Ariz., specimen of Hawk-moth. 1247 (X).

BARRINGTON, W. A., Tooele City, Utah. Specimen of rock from Utah. 1024 (XVII).

BEALE, E. F., Manchester-by-the-Sea, Mass. Specimens of wild flowers from California. (Returned.) 836 (XV).

BECKER BROTHERS, Baltimore, Md. Specimen of rock from Blue Ridge Mountain, near Harpers Ferry. 960 (XVII).

BEDICKIAN, S. V., Washington, Pa. Old coin from Asia Minor sent for identification. (Returned). 1116 (I).

BENNETT, RICHARD, Eureka Springs, Ark. Specimen of ore from Arkansas. 1065 (XVII).

BISHOP, ALEXANDER, Teges, Ky. Through the Department of State, specimens of ore. 1041 (XVII).

BISHOP, W. L., Kentville, Nova Scotia. Twenty-nine eggs of *Dendragapus canadensis*. (Thirteen eggs purchased, and the others returned.) 895 (23558) (V, B).

BOGAN, CHARLES, Jamestown, Cal. Chrysalis of insects. 1214 (X).

BOND, WARREN R., Custer, S. Dak. Two specimens of ores. 1123 (XVII).

BOERNSTEIN, HENRY N., Washington, D. C. Three specimens of fossil mollusks from the Mokkatam quarries, Egypt; fossil crustacean from the same locality; shell of supposed oyster from the Libyan Desert, Egypt; 8 specimens of fossilized wood from the petrified forest (?) of Egypt; supposed shell from the Libyan Desert; 2 specimens of the Mediterranean sea-fish, representing the superior and inferior maxillaries; two scarabs from the site of ancient Memphis, with hieroglyphics on the under side; Egyptian antique (blue glaze), representing a mummy, 4½ inches in height; Egyptian antique (black glaze), representing a mummy, 4½ inches in height, and a Roman (?) bronze coin found in Egypt. (Returned.) 1000 (I; II, A; VII; IX).

BONNEY, Dr. A. F., Defiance, Iowa: Piece of ivory (?) found in a bed of gravel-drift in Monona County, Iowa. 1063 (XII).

BORUFF, G. J., Rhodelia, Tenn.: Specimen of ore from Tennessee. 915 (XVII).

BOTSFORD, Z. E., Nordmont, Pa.: Specimen of insect from Pennsylvania. 1089 (X).

BOURLAND, Dr. A. M., Van Buren, Ark.: Two specimens of minerals. 817 (XVI).

BOWMAN, N. W., Massanetta Springs, Va.: Specimen of mineral. 825 (XVI).

BOWLES, Rev. A. C., Abington, Mass.: Specimen of insect. 859 (X).

BRADDY, E. L., Mitchell, Ga.: Indian pipe. Purchased. 943 (23824) (III).

BRADEN, I., Phebe, Tenn.: Specimen of ore. 1203 (XVII).

BRITTS, J. H., Clinton, Mo.: Fossil plants. 1121 (XIV).

BROCK, HERBERT E., Mason City, Iowa: Fossils. 1119 (XIII, A).

BROOKS, ERVIN, Crown Point Center, N. Y.: Specimen of ore sent for chemical analysis. (Returned.) 1002 (XVII).

BRUCE, E. C., Winchester, Va.: Specimen of chert from the summit of the limestone ridge adjoining Winchester. 902 (XVII).

BRYANT, WALTER E., San Francisco, Cal.: Mounted specimen of Humming bird. 947 (V, A).

BUCKMAN, C. T., West Liberty, Iowa: Two specimens of moths. 1232 (X).

BURCH, CHARLES E. S., Wenatchee, Wash.: Specimen of ores from Washington. 976 (XVII).

BÜRGI BROTHERS, Rochester, N. Y.: Relief map of Palestine. (Returned.) 1190 (24475). (II, A).

BURK, FRANK, Eureka, Utah: Specimen of mineral. 1145 (XVI).

BUSH, W. R., Lake City, Fla: Specimen of mineral from Columbia County. 892 (XVI).

BUTLER, Prof. A. W., Brookville, Ind.: Carboniferous fossils from New Mexico. 1178 (XIII, A).

CAMERON, MILES T., Flagstaff, Ariz.: Specimen of mineral found in the Grand Cañon of the Colorado. 1149 (XVI).

CAMPBELL, J. J., Hot Springs, N. C.: Two specimens of minerals. 1198 (XVI).

CAMPBELL, W. S., Johnson City, Tenn.: Specimens of minerals. 1030 (XVI).

CAMPFIELD, C. H., Magdalena, N. Mex.: Specimen of ore from New Mexico. 981 (XVII); specimen of mineral found in the Magdalena Mountain, New Mexico. 1050 (XVI).

CARTER AND ROGAN, Lafayette, Ga.: Specimens of rock from a tunnel in Pigeon Mountain, a spur of Mount Lookout. 922 (XVII).

CARY, EDWARD A. (See under N. A. Theodorodi.)

CAVER, J. L., Vernon, Tex.: Specimen of mammal, in the flesh, from Texas. 1182 (IV).

CESSNA, WILLIAM T., Chicago, Ill.: Specimen of ore. (Returned.) 968 (XVII).

CHASE, JAMES H., Wenatchee, Wash.: Specimen of clay and specimen of rock from Washington. 974 (XVII); specimen of mineral from the same locality. 1034 (XVI).

CHESNEY, J. C., Northumberland, Pa.: Specimens of minerals and ores from Pennsylvania. 910, 917, 1015 (XVI, XVII).

CHICKEY, CHARLES E., Scranton, Miss.: Specimen of caterpillar. 841 (X).

CISCO, J. G., Jackson, Tenn.: Fossil from the glades of Wayne County, and specimens of smaller fossils from the same locality. 1092 (XIII, A).

CLAIBORNE, J. H. & SON, Well Spring, Tenn.: Specimen of ores. 1166 (XVII).

CLARK, GEORGE W., Wyandale, N. Y.: A substance found on the surface of a well. 1006 (XVI).

CLAUSE, HENRY, Phebe, Tenn.: Specimens of ores. 1129, 1179 (XVII).

COBB, R. E. C., St. Paul, Minn.: Specimen of bird, in the flesh. 866 (V, A).

COLLEGE OF SCIENCE, Imperial University, Tokio, Japan (through Dr. J. Ijima): 85 specimens of Japanese birds. (Returned.) 998 (V, A).

CONNER, I. S., Powell's Station, Tenn.: Two specimens of ore. 1093 (XVII).

CONWAY, W. B. (See under Montgomery Marble Company.)

CORNELL, EDWIN, P. M., Pomeroy, Ill.: Concretionary nodule of pyrite from Mercer County. 1066 (XVII).

CORRY, E. M., Magnolia, Ark.: Specimen of insect. 809 (X).

COULSON, GEORGE, La Harpe, Ill.: Image found while digging a well in La Harpe; stone found in drift-sand and gravel on Honey Creek, Henderson County, Ill. 994 (III).

CUNHA, ANTONIO, Big Pine, Cal.: Specimens of ore from Inis mine, Deep Spring Valley. 1108 (XVII).

CURRAN, L. R., Adair, Iowa.: Two pieces of bone found in Adair County on a drift 42 feet below the surface. 1001 (XII).

DABBS, J. R., Chelan, Wash.: Specimens of ore from Washington. 871 (XVII).

DAHLER, C. H., Helena, Mont.: Specimen of mineral. 929 (XVI).

DANFORD, W. S., Boulder, Colo.: Specimen of fossil (?) embedded in a hard shale-like substance. 1220 (XVII).

DANTAGNAN, J. D., New Orleans, La.: Specimen of crab. 1231 (24513) (XI).

DARLING, JAMES, Alpine, Tex.: Specimens of ores. 844 (XVII).

DAVIDSON, W. B. M., Kissimmee, Fla.: Tooth found in the phosphate beds in Peace River, near Arcadia, Fla. 874 (IV).

DAWSON, F. W., Charleston, S. C.; Larvæ of insects. 854 (X).

DEAN, FRED., Lowville, Pa.: The "Miller axe," found under an oak log in Benton, Ohio. (Returned.) 1067 (III).

DIETZ, OTTOMAR, New York City, N. Y.: Two hundred species of North America coleoptera. (Returned.) 993 (X).

DISMER, H. F. E., Washington, D. C.: Picture found behind the mantel in a house in the city of Washington. 903 (I).

DODGE, BYRON E., Richfield, Mich.: Stone ax with handle, red stone pipe, and arrow-head. 1056 (24272) (III).

DUNCAN, A. L., Dunedin, Fla.: Specimen of caterpillar. 873 (X).

DUNNELL, L. W., Mulvane, Kans.: Specimen of beetle from Kansas. 1154 (X).

DURANT, S. W., St. Charles, Ill.: Two specimens of insects. 1185 (X).

EAST, HENRY, Fredericksburgh, Tex.; Specimen of feather ball, supposed to have been made by insects. 1202 (X).

ECKERT, J., Newark, N. J.: Insect from Newark. 802 (X).

ELKINS, S. B., Elkins, W. Va.: Sample of well-water. 850 (XVI).

EMMERT, J. W., Bristol, Tenn.: Mineral. 937 (XVI).

ENGLISH, GEORGE L. & CO., New York City, N. Y.: Minerals from various localities. (Returned.) 1155 (XVI).

EPPLEY, WILLIAM, Zanesville, Ohio: Rocks and clay from Ohio. (Returned.) 1040 (XVI).

ETCHISON, L. C., Jefferson, Md.: Ten ancient coins, confederate two-dollar note, and specimen of amethyst from Frederick County. 1087 (I, XVI).

EVERTS, ARTHUR A., Dallas, Tex.: Fern. 1132 (XV).

FARNHAM, A. B., Benning's, D. C. (through P. A. Gannon): Stone relic from near Plantsville, Conn. (Returned.) 914 (III).

FAUGHT, M. M., Idaho Falls, Idaho: Two specimens of supposed kaolin. 1160 (XVII).
FERRIS, J. S., Silver Reef, Utah: Mineral. 1042 (XVI).
FINDLEY, W. R., Hoodsport, Wash.: Ores. 1211 (XVII).
FISHER, FREDERICK C., Middlesboro, Ky.: Ore from Kentucky. 1011 (XVII).
FISHER, FREDERICK C. & Co., Middlesboro, Ky.: Minerals from Kentucky. 973 (XVI).
FISHER, GEORGE W., Alaska, W. Va.: Larva of insect. 865 (X).
FLECHTER, VICTOR S., New York City, N. Y.: Viola d'Amour from Germany, Hurdy-Gurdy, and a Kit from London. (Purchased.) 957 (23899) (I).
FLEIG, FRED, Ripley, Ohio: Insect. 1222 (X).
FLETCHER, L. M., Decatur, Mich.: Luna-moth. 1192 (X).
FLETCHER, S., Phebe, Tenn.: Three specimens of ores. 845, 906 (XVII).
FLETCHER, W. A., Rhodelia, Tenn.: Two specimens of ores. 840, 1172 (XVII).
FLOYD, JOHN E., Helena, Ohio: Moth from Ohio. 1075 (X).
FOGARTY, Miss LIZZIE, Braidentown, Fla.: Specimen of insect. 955 (X).
FOGLESONGER, J. M., Shippensburgh, Pa.: Cecropia-moth. 1207 (X).
FORD, Mrs. MARY E., Hazlehurst, Miss.: Specimen of moth or butterfly. 1128 (X).
FORRESTER, ROBERT, Schofield, Utah: Specimens of invertebrate fossils from Iron County, Utah. (Returned with one exception.) 1049 (XIII, B). Fossils from Utah. 1168 (XIII, B).
FOSTER, F. D., Norwalk, Ohio: Copies of 42 photographs of Zulus. 884 (23602). (II-A).
FOSTER, J. H., Marshall, Va.: Two specimens of minerals from Virginia. 1044 (XVI).
FOWKE, GERARD, Sidney, Ohio: Quartz "Butterfly gorget," and a shaft-rubber from Monongahela City, Pa.; paleolithic axe from Flint Ridge, and a hematite cone from Augusta, Ky.: 3 small worked flints from Flint Ridge and Ripley, Ohio. 872 (23599) (III).
FOWLER, Dr. S. MILLS, Gainesville, Tex.: Specimen of chrysalis. 1218 (X).
FREAD, E. C., Des Moines, Iowa: Concretion (?) found in Iowa. 1086 (XVII).
FRENCH, CLARENCE E., Jacksonville. Tex.: Mineral. 816 (XVI).
FRYE, LEVI, Pinkerton, Va.: Minerals. 992 (XVI).
FUCHS, H. T., Tiger Mills, Tex.: Minerals from Texas. 935 (XVI). (See under P. A. Graves.)
FULLER, H. DOUGLAS, Winchester, Va.: Sample of clay from Frederic County, Virginia. 1124 (XVII).
GAME, M. F.: (See under C. R. Richey.)
GANNON, P. A. (See under A. B. Farnham.)
GARNER, R. L., Roanoke, Va.: Two specimens of minerals from Franklin County. 806 (XVI). (See under Johannes Marjenhoff, and Roanoke Stock Exchange.)
GARRISON, C. G., Santa Ana, Cal.: Specimens of ore from California. 961 (XVII).
GARWOOD, SPENCER, Milford Center, Ohio: Shrew. 1082 (IV).
GHISELIN, Miss H. V., Louisville, Ky: Two specimens of pottery. (One returned and the other presented). 889 (II, B).
GIBBONS, J. A., Quijotoa, Ariz.: Sample of Indian paint, and a black stone or shale found in Pima County. 1046 (XVII).
GILBERT, Mrs. A., Plainfield, N. J.: Twenty-one specimens of lepidoptera. (Returned.) 1022 (X).
GILBERT, J. E., Mitchell, S. Dak.: Tooth of fossil shark. 1114 (XII).
GIRDWOODE, WILLIAM, Hospital Corps, U. S. Army, Fort Riley, Kans.: Specimen of moth. 1188 (X).
GRAVES, P. A., Tiger Mills, Texas (through H. T. Fuchs): Minerals from Texas. 934, 967 (XVI).
GRAY, S. R. S., East Sound, San Juan County, Wash.: Minerals from Washington. 939 (XVI).
GREEN, Prof. H. A., Chester, S. C.: Sample of clay. 1098 (XVII).

GREENEBAUM, W. B., Oakland, Cal.: Minerals from California. 997 (XVI).

GRIFFITH, FRANK, Glendive, Mont.: Specimens of fossil wood and ores. 1125 (XIV, XVII).

GROSVENOR, Hon. C. H., House of Representatives: Ore from Pennsylvania. 911 (XVII).

HAGUE, T. O., New York city, N. Y.: Eleven ethnological paintings and pictures from the Bombay Exhibition. (Returned.) 1146 (II, A).

HALLOWELL, Prof. H. C., Sandy Spring, Md.: Mineral from Montgomery County. 933 (XVI).

HAMILTON, J. T., Spokane Falls, Wash.: Samples of earth. 814 (XVII).

HAMPTON, ALFRED, El Paso, Tex.: Specimen of work made by a species of silkworm in the Sierra Madre Mountains of old Mexico. 907 (X).

HARRIS, D. B., Payson, Ariz.: Quartz. 800 (XVII).

HARRIS, Hon. ISHAM G., United States Senate: Ore. 875 (XVI).

HARRIS, JOSEPH A., Provo City, Utah: Coal, graphite (?), and minerals. 958, 970 (XVI, XVII).

HART, WILLIAM H. & CO., New York city: Skin and skull of Lion-slaying Monkey, and Red-fur Monkey. 1074 (24209) (IV).

HART, WILLIAM R., Camanche, Iowa: Specimens of dendrite from near Camanche, and two specimens from near Silver Cliff, Colo. 918 (23733) (XVI).

HAZARD, GEORGE W., Los Angeles, Cal.: Rocks from California. 946 (XVII).

HEACOCK, J. W., Alpine, Ala.: Minerals. 1139 (XVI).

HEMPEL, ADOLPH,, Hillsdale, Mich.: Two skins of Florida Gallinule, from Villa Nova. 1005 (V, A).

HENSHAW, S. B., Stanardsville, Va.: Ore from Virginia. 984 (XVII).

HERBERT, Dr. G. H., Beaver City, Utah: Specimens of mineral rock. 877 (XVI).

HERRING, Mrs. F. O., Plainfield, N. J.: Thirty-one species of North American lepidoptera. (Returned all but one specimen.) 990 (X).

HESS, R. A., Arkansas City, Kans.: Sample of earth. 1016 (XVII).

HEWITT, G. C., Rock Springs, Wyo.: Geological material. 1045 (XVII).

HEYENS, JAMES H., Ogden, Utah: Ores. (Returned.) 1084 (XVII).

HEYMANN, S., Fayetteville, Tenn.: Ore. 1150 (XVII).

HILL, FRED. A., Havana, N. Y.: Insect. 1118 (X).

HILL, L. F., Rico, Colo.: Specimen of madstone. 1023 (I).

HILL, Dr. W. Scott, Augusta, Me.: Chippings from the material of which arrow and spear-heads are made in the Kennebec Valley. 987 (XVII).

HILTON, GEORGE, Coral, S. Dak.: Sample of clay from South Dakota. 899 (XVII).

HILTON, J. W., Acworth, Ga.: Ore. 1104 (XVII).

HODGE, H. G., York, Ill.: Samples of clay containing shells and sample of sand. 843, 864 (IX, XVII).

HOLLY, L. B., Biloxi, Miss.: Specimen of ore (?) from near Biloxi. 1131 (XVII).

HOLMES, J. A., Chapel Hill, N. C.: Specimen of slug. (Returned.) 919 (IX).

HOMER, F. L., New Hamburg, Pa.: Skin of bird from New Hamburg. 1009 (V, A).

HOPPING, RALPH, Bloomfield, N. J.: Twenty-six species of North American coleoptera. (Returned). 1008 (X). Thirty-seven specimens of coleoptera. (Returned.) 1020 (X). Beetles from New Jersey. (Returned). 1068 (X).

HORNBECK, LEWIS N., Minco, Chickasaw Nation, Ind. T.: Specimen of butterfly. 1171 (X).

HOUGHTON, C., Batavia, N. Y.: Insect. 838 (X).

HOVEY, GEORGE U. S., White Church, Kans.: Insect. 1105 (X).

HUNTER, FRANK, Eureka, Utah: Mineral. 931 (XVI).

HYDE, J. A., Nephi, Utah: Ores from Utah. (Returned.) 991 (XVII).

INGERSOLL, J. Z., Lee, N. Y.: Insect. 1137 (X).

JACOBS, Dr. P. B., Henry, Ill.: Specimen of supposed petrified pear. 801 (XVII).

JACKSON, THOMAS, Plymouth, Mass.: Sample of earth. 815 (XVII).

JACKSON, T. H., Westchester, Pa.: Three sets of eggs of *Callipepla squamata castanogastris*, representing 44 specimens. (Purchased.) 894 (23557) (V, B.).

JARVIS, BURT, Theresa, N. Y.: Specimen of butterfly. 1239 (X).

JASKE, BROTHER HERMANN, Dayton, Ohio: Small collection of shells from various localities. (Returned.) 879 (IX); collection of shells, 951 (IX); specimens of minerals and shells. (Returned.) 1036 (IX, XVI).

JOHNSTON, Rev. E. F., Tallula, Ill.: Section of grapevine taken from a coal-shaft 891 (I).

JONES, GEORGE E., Columbus Grove, Ohio: Specimen of butterfly. 1134 (X).

JONES, Dr. LEVI, Green River, N. C.: Mineral. 849 (XVI).

JORDAN, W. T., Griffin, Ga.: Mineral. 1059 (XVI).

JOUY, P. L., U. S. National Museum: Supposed aluminum ore from Arizona. 966 (XVII).

JOYNES, W. N., Wesson, Miss.: Specimen of butterfly. 842 (X).

KANE, JAMES A., Jensen, Utah: Mineral. 1052 (XVI).

KAZEE, W. L., Lowmansville, Ky: Minerals. 980, 988 (XVI).

KEITH and BLISS, Drs., Bonne Terre, Mo.: Specimen of fossil tooth. 822 (XII).

KENNEDY, E. B., Amicus, Va.: Specimen of ore from Virginia. 969 (XVII).

KENNEDY, THOMAS C., Baltimore, Md.: Stone from Baltimore. 1013 (XVII).

KNIGHT, E. B., Woodford, Ontario, Canada: Insects. 1209 (X).

KNOTT, W. T., Lebanon, Ky.: Sample of well-drillings. 908 (XIV).

KNOWLES, F. E., Spencer, Iowa: Specimens of grass and birds' eggs. 901 (V, B; XV).

KOHN, GUSTAVE, New Orleans, La.: Snakes, 1058, 1183 (VI).

KOBBE, Maj. W. A., U. S. Army, Artillery School, Fort Monroe, Va.: Fungus. 847 (XV).

KREISHER, D., Johnson City, Tenn.: Ores from Tennessee. 1012, 1014 (XVII).

KUENCER, O. F., Kingman, Ariz.: Insects injurious to grapevines; also bulbs or lumps which injure cottonwood trees in Arizona. 900 (X).

LAMBERT BROTHERS, Kearney, Nebr.: Bird-skin. 1142 (24385) (V, A).

LAMPHERE, F. W., Chittenango, N. Y.: Samples of well-drillings. 882 (XIV).

LANE, WILFRED, Wild Rose, Wis.: Crystalline quartz. 1126 (XVII).

LAWS, FRANKLIN, Windom, N. C.: Minerals. 1229 (XVI).

LEAVELL, J. M., Culpeper, Va.: Insects. 1043 (X).

LEDY, J. H., Marion, Pa.: Sample of earth. 876 (XVII).

LEE, G. S., Lyerly, Ga.: Mineral. 1080 (XVI).

LEE, Miss JANE E., Richmond, Ala.: Ore. 1010 (XVII).

LEGGE, J. F., Shepherdstown, W. Va.: Mineral. 1028 (XVI).

LESTER, Mrs. G. P., Chillicothe, Ill.: Moth. 1187 (X).

LEWTER, F. A., Orlando, Fla.: Indian bowl. (Returned.) 831 (II, B).

LIVINGSTON, E., New Orleans, La.: Specimen of *Benacus griseus*. 870 (X).

LOMBARD, H., Westfield, Mass.: Minerals. 1072 (XVI).

LOWNDES, C. GAMBLE, Baltimore, Md.: Two specimens of Bob-white (mounted). (Returned.) 965 (V, A).

LOVE, Dr. T. B., Gunsight, Tex.: Butterfly. 1194 (X).

LUPTON, JOHN S., Winchester, Va.: Rock, supposed to be "coal-bloom." 797 (XVII).

LYON, HENRY S., Sollitt, Ill.: Luna-moth. 1152 (X).

MCCAIGUE, P., Danvers, Mass.: Insect. 1189 (X).

MCCOMAS, FREDERICK F., Hagerstown, Md. (through Hon. L. E. McComas): Iron ore and a bottle of mineral water. (Water returned.) 887 (XVII).

MCCOMAS, Hon. L. E. (See under Frederick F. McComas.)

MCDONNELL, F., Grant, Tex.: Insect. 813 (X).

MCGALLEARD, W. M., Connelly Springs, N. C.: Mineral. 834 (XVI).

MCILWRAITH, T., Hamilton, Ontario, Canada.: Eight specimens, representing 6 species, of birds, from the vicinity of Toronto. (Returned.) 890 (V, A).

MANNING, T. H., Mineral, Idaho.: Insect. 1244 (X).

MARJENHOFF, JOHANNES, Charleston, S. C. (through Mr. R. L. Garner): Calc tufas from the south of Germany. 1029 (XVII).

MARSH, JOHN S. Chicago, Ill.: Plants. 1243 (XV).

MARTIN, D. G., Eagle Rock, Idaho.: Specimen of supposed kaolin. 1133 (24409) (XVII).

MAY, WILLIAM R., Nephi, Utah.: Mineral. 985 (XVI).

MAYDWELL, Rev. GEORGE E., Baltimore, Md.: Insects. 977 (X).

MEDDOCK, FRANK, Maineville, Ohio: Two fossils found in a strata of rock. 1071 (XIII, A).

MEEKER, Dr. J.W., Nyack-on-Hudson, N. Y.: Plants. 938, 1159 (XV).

MELLINGER, I. G., Stephenson, Va.: Minerals. 999, 1018 (XVI).

MELVILLE, W. P., Orillia, Ontario, Canada: Crystals. 839 (XVI).

MENZL, A., Steinway, Long Island: Supposed petrified wood. 1140 (XVI).

MERRILL, GEORGE R., Grand Rapids, Mich.: Collection of Parker's and Weaver's Almanacs, 1730–1750 inclusive, and an Indian skull. 851 (23582). (I, III).

METCALFE, CHARLES, Las Cruces, N. Mex.: Sample of kaolin. 1060 (XVII.)

MIARS, FREMONT, Hartmonsville, W. Va.: Mineral. 941 (XVI).

MILBURN, BERT, Round Hill, Va.: Moth. 1195 (X).

MILLER, B. F., East Martinsburgh, N. Y.: Moth. 1206 (X).

MILLER, H. D., Plainville, Conn.: Egg-case of skate or ray. 883 (VII).

MILLER, G. M., Newport, Ky.: Seed found among Persian locusts. 837 (XV); moth. 1167 (X).

MILLER, G. S. jr., Cambridge, Mass.: Three specimens of Thomomys nov. sp. (Returned.) 1100 (IV); skin and skull of Jumping-mouse. (Returned.) 1115 (IV); specimens of Harvest-mice from Kansas. (Returned.) 1144 (IV.)

MILLER, M. J., Deadwood, S. Dak.: Specimens of fossiliferous slate rock. 1210 (XVI).

MITCH, JOHN L., Edmond, Okla.: Specimens of grass. 1227 (XV).

MONTGOMERY MARBLE COMPANY, Blacksburgh, Va. (through W. B. Conway): Specimen of black marble from Virginia. 860 (XVII).

MOOREHOUSE, JOSEPH, Hibernia, Fla.: Sample of earth. (Returned.) 1083 (VIII).

MOYERS, MARION, Compensation, Tenn.: Fossils, shells, and ores. 1186 (XIII, A; XVII).

MUIR, JOHN, Brooklyn, N. Y.: Two samples of earth. 953 (XVII).

MULKEY, J. K., Los Angeles, Cal.: Mineral from California. 983 (XVI).

MUNGER, C. A., Hannibal, Mo.: Specimen of mineral and a fossil. 949 (XIII, A; XVI).

MURPHY, THOMAS M., Sanborn, W. Dak.: Ancient silver coin found in an old fort in Ireland. (Returned.) 1037 (I).

MYER, W. E., Carthage, Tenn.: Jaw-bone of porpoise. (Returned.) 832 (IV).

MYERS, Dr. R. P., Green Mountain Falls, Colo.: Anatomical specimen. 1163 (IV).

NARRIN, Mrs. M. L., Goodrich, Mich.: Geological specimens from Hadley Hill. 1157 (XVII).

NELSON, CHRISTIAN, Virginia City, Mont.: Sample of clay. (Returned.) 1062 (XVII).

NELSON, WILLIAM, Sally, S. C.: Specimens of supposed marl, limestone, and chalk from Aiken County. 1054 (XVII).

NEWLON, Dr. W. S., Oswego, Kans.: Specimens of fossil-leaf coral. 1076 (XIII, A).

NOYES, J. B., Lawrenceburg, Tenn.: Ore. 927 (XVII).

O'FARRALL, Hon. CHARLES T., Harrisonburg, Va.: Ore. 1101 (XVII).

OLDHAM, Mrs. NATHAN J., Johnstown, Pa.: Horsefly and electric-light bug. 1153 (X).

OLIVER, J. F., Steubenville, Ohio: Leaves from maple tree. 920 (XV).

OSBORNE, E. & SON, Fort Smith, Ark.: Insect from Indian Territory. 1135 (X).

OSBORN, Prof. H. L., Hamline, Minn.: Shells. (Returned.) 1103 (IX).

PAGE, J. B., North Fork, Cal.: Herbs. 1181 (XV).

PALMER, W. L., Crookston, Minn.: Hide of moose. 1122 (24384) (IV).

PARK, Mrs. KATHERINE B., Hampton, Va.: Insect. 1217 (X).

PARRISH, GEORGE W., Wenatchee, Wash.: Specimens of lime and stone containing crystals. 830 (XVII).

PATTON, W., Prestonville, N. C.: Stones. 1191 (XVI).

PETERSON, R., Green Mountain, N. C.: Three minerals. 1026 (XVI).

PHILLIPS, L. E., Peede's, Tex.: Insect. 1161 (X).

POOL, CHARLES, Hubbardstown, W. Va.: Two photographs representing the skull of a hog. 996 (IV).

POTTER, Miss ELLA B., Norwich, Kans.: Moth. 1147 (X).

PRICE, I. K., Holly Brook, Va. (through D. W. M. Wright): Specimens of rocks. 1017 (XVII).

PROCK, A. B., Osceola, Mo.: Mineral. 1091 (XVI).

RANKIN, J. A., Mer Range, La.: Insect from Louisiana. 886 (X).

RAYBURN, ROBERT, Elkhorn Station, W. Va.: Insect. 1240 (X).

REICH, M., St. Joseph, Mo.: Insect. 1165 (X).

REYNOLDS, P. V., Copenhavers Mills, W. Va. (through Hon. G. W. Atkinson): Ore from West Virginia. 1021 (XVI).

RIBLETT, F., Rahway, J.: Worm. 858 (X).

RICHEY, C. R., Abbeville, S. C. (through M. F. Game): Sample of earth. 1079 (XVII).

RICHTER, Rev. EDWARD F., Cairo, Ga.: Scales of Gar. 857 (VII); minerals. 1109 (XVI).

RISING, H. A., San Bernardino, Cal.: Specimen of ground gypsum. 820 (XVII).

ROACH, Mrs. A. D., Louisville, Ky.: Moth. 1246 (X).

ROANOKE STOCK EXCHANGE, Roanoke, Va. (through R. L. Garner): Specimens of granite and mineral. 888 (XVI, XVII).

ROARK, J. M., Charlotte, N. C.: Worm. 856 (X).

ROBBINS, S. G., Siverly, Pa.: Insect. 1200 (X).

ROBERTS, S. P., Big Pine, Cal.: Samples of clay. 1112, 1158 (XVI, XVII).

ROBINSON, JAMES H., Lewiston, Idaho: Specimens of magnesia stone. 1170 (24426) (XVII).

ROBINSON, JOHN M., Bozeman, Mont.: Specimens of mineral. 982, 1090 (XVI).

ROESSLER, A. R., San Antonio, Tex.: Sample of mineral water. 829 (XVI).

ROGAN, CHARLES L., Kenton, Ohio: Sample of a substance from a well. 1223 (XV).

ROGAN, JAMES W., Amis, Tenn.: Two specimens of fossils. 936 (XIII, A). Mineral from Tennessee. 1069 (XVII). Specimen of stone such as was formerly used for millstones. 1094 (XVII).

ROLFE, HATTIE M., Sherman, S. Dak.: Specimen of insect. 1235 (X).

ROMER, J. L., Anacortes, Wash.: Floss of "fire-wood." 897 (XV).

ROSE, OVEREND G., Lakeport, Cal.: Specimen of Woodpecker. 1032 (V, A).

ROSEDAHL, N., Whiting, Kans.: Mineral. 1102 (XVI).

ROSENTHAL, JOSEPH, New York city, N. Y.: Three specimens of birds. (Returned.) 1230 (V, A).

ROUSE, THOMAS, Jr., Leota, Pa.: Insects. 1143 (X).

SACHLAND, NATHAN, Waxahachie, Tex.: Moth. 1151 (X).

SAMPSON, GEORGE T., Boston, Mass.: Insect from Rhode Island. 1237 (X).

SCHAAF, PHILIP, Tucson, Ariz.: Ore. 1033 (XVII).

SCHREIBER, J. D., Allentown, Pa.: Ores. 1180 (24425) (XVII).

SCOTT, Dr. A. J., Nahma, Mich.: Plant. 826 (XIV).

SCREVEN, E. W., Columbia, S. C.: Plants and insects. 1193 (X, XV).

SECREST, T. D., Okolona, Ark.: Fossil bones of mammals. 972 (24275) (XII).

SHEARER, R. A., Elko, Nev.: Moth. 898 (X).

SHERIDAN, EDMUND J., Cleveland, Ohio: Shells from Florida. 1212 (IX).

SHIPLEY, E. A., Jonesboro, Tenn.: Mineral. 1055 (XVI).

SIMPSON, A. M., Straubville, N. Dak.: Mineral. 1213 (24486) (XVI).

SLAYTON, C. M., Grattan, Mich.: Two small clay tablets, taken from mounds in Montcalm County. (Returned.) 1162 (III).

SMEDLEY, S. H., Sanger Junction, Cal.: Specimen of ore (?). 979 (24313) (XVI).

SMITH, EDWARD, Port Hope, Ontario, Canada: Insect. 1169 (X).

SMITH, G. T., Middlesboro, Ky. Mineral. 1110 (XVI).

SNYDER, JACOB, Two Taverns, Pa.: Specimen of stone from Adams County. 1136 (XVI). Specimen, of meteoric iron. 1196 (XVI).

SPANG, NORMAN, Etna, Pa.: Stone hatchet from North Carolina. 1138 (III).

SPENCER, Miss FLORENCE I., Oak Lawn, Fla.: Snake. 853 (23479) (VI).

SPINDLE, H. H., Warrenton, Va.: Minerals. 823, 827 (XVI).

SPRAY, S. J., Salida, Colo.: Bird. 880 (23528) (V. A.). Skin of mammal. 952 (IV).

STATE, DEPARTMENT OF. (See under Alexander Bishop.)

STEDMAN, A. B., Minnesota Lake, Minn.: Insect. 1215 (X).

STEELE, JOHN G., Rock Hill, S. C.: Mineral. 942 (XVI).

STEINBAUER, E. F., Vandalia, Ill.: Bird. (Returned.) 1156 (V, A).

STEINER, R., Waynesboro, Ga.: Collection of stone implements from mounds and village sites in the vicinity of Waynesboro. (Returned.) 1081 (III).

STEVENSON, E., Granite Cañon, Wyo.: Plants. 1127, 1199 (XV).

STOCKBRIDGE, Hon. F. B., United States Senate: Stone. 810 (XVII).

STOKES, W. R., Wallace, Idaho: Insects. 1208 (X).

STONE, WITMER, Academy of Natural Sciences, Philadelphia, Pa.: Bird. (Returned.) 971 (V. A).

STONER, D. U., Mount Joy, Pa.: Piece of ash wood with profile of a human face. (Returned.) 995 (I).

STRUNK, D., Mankato, Minn.: Insects. 799 (X).

STUART, R. C., Brunswick, Ga.: Insects. 869 (X).

SWINGLE, O. H., Dudleyville, Ariz.: Ore. 1130 (XVII).

SYBERT, O. P., Ravenswood, W. Va.: Specimens of ore. 1225 (XVII).

TAYLOR, DOUGLAS, Columbus, Ohio: Specimen of diatomaceous earth. 1064 (XIV).

TAYLOR, J. C., Springer, N. Mex.: Sample of a deposit found about six miles from Springer. 1095 (XVII).

TEGARDEN, W. S., Fort Scott, Kans.: Minerals. 821, 1088 (XVI).

THE D. H. RANCK PUBLISHING COMPANY, Indianapolis, Ind.: Specimen of stone. 811 (XVII).

THEODORIDI, N. A., Constantinople, Turkey (through Mr. Edward A. Cary): Nine Babylonian seal cylinders or cuneiform tablets. (Returned.) 1053 (I).

THORPE, Dr. H. H., Liberty Hill, Tex.: Mineral. 1061 (XVI).

THRELKELD, F. R., Los Angeles, Cal.: Specimen of supposed graphite. 1007 (XVII).

TICKNOR, F. A., Rockford, Ill.: Skull supposed to have been taken from a mound near Rockford, and a copper spear-head from the same locality. 1073 (24273) (III).

TILTON, W. L. R., Prairie Depot, Ohio: Insect. 1205 (X).

TOUZALEN, C. V., Bristol, Tenn.: Insect. 1148 (X).

TREAT, R. G., Cleveland, Ohio: Three pipes and an ornamented stone object. 959 (III).

TRESCOTT, Judge WILLIAM H., Washington, D. C.: Specimens of marble. 954 (XVII).

TREWEEK, JOHN, Salt Lake City, Utah: Ore from Idaho. (Returned.) 986 (XVII).

TRUSSELL, J. N., Shepherdstown, W. Va.: Ores. (Returned.) 1070 (XVII).

TULLORT, Miss FLORENCE E., Newark, Ohio: Insects. 1228 (X).

TUTTLE, Mrs. MARY E., Sabetha, Kans.: Butterfly. 1164 (X).

TYSON, M., Hope, Ark.: Bone of a mammal. 925 (XII).

VAN ALLEN, GEORGE C., Mount Pleasant, Iowa: Specimens found deposited on grass. 1234 (X).

VAN DEURSEN, GEORGE L., Vernon, Tex.: Insect. 1197 (X).

VAN VLIET, F. C., Shrewsbury, N. J.: Specimen of growth found on a young red cedar tree. 1117 (XV).

VANNAY, E., Goshen, Ark.: Chert with iron pyrites. 1106 (XVII).
VARNER, Miss RILE, Berwick, Pa.: Quartz. 1204 (XVI).
RINGHARZ, THEO. VON, Middletown, Va.: Small tube cemented together with small gravel found in a spring near the North Carolina line, in Tennessee. 932 (X).
WAGNER, W. H., Cleveland, Ohio: Two Indian stone axes. 962 (III).
WALKER, E. A., Moulton, Iowa: Piece of a meteorite. (Returned.) 1025 (XVI).
WALKER, JOHN, Muldon, Miss.: Insect. 878 (X).
WARD, ELBORN T., Trinidad, Colo.: An iron hanging-lamp, probably of French or Spanish make, found in an old adobe building. 904 (23657) (II A).
WARREN, HENRY, & Co., Oregon, Tenn.: Ore. 1035 (XVII).
WATKINS, GEORGE F., Moriah, N. Y.: Rock. 812 (XVII).
WATKINS, GEORGE W., Moriah, N. Y.: Ores. 916, 964 (XVII). Specimen of mineral. 1047 (XVI).
WATROUS, E., Weiser, Idaho: Specimen of supposed kaolin. 1173 (XVII).
WATTS, W. C., Smithland, Ky.: Piece of supposed petrified pork. 950 (XIII, B).
WEBB, J. S., Elkhorn, W. Va.: Insect. 1219 (X).
WEBB, W. L., Asbury Park, N. J.: Cocoon of insect. 863 (X).
WEIGLE, J. A., Washington, D. C.: Chipped flint leaf-shaped implement from St. Lawrence County, N. Y. (Returned.) 1078 (III).
WELCH, I. E., Alpine, Ala.: Iron ore. 928 (XVII).
WENNER, Samuel, Drifton, Pa.: Butterfly. 1120 (X).
WERTH, J. M., Stockton, Va.: Ores. 855 (XVII).
WEST, C. S., Sumter, S. C.: Leaf and seeds of fern (?) 1141 (XV).
WESTERVELT, Mrs. F. M., Rural, Fla.: Rock. 1201 (XVII).
WETHERBY, M. K., Trenton, N. J.: Moth and cocoon. 1176 (X).
WHITE, Stewart E., Grand Rapids, Mich.: Three birds' skins. (Returned.) 867 (V, A).
WHITEHORN, Worth, Saratoga, Nebr.: Moth. 1241 (X).
WICKER and ROCKETT, Red Oak, Tex. Insect. 1184 (X).
WIGERSMA, P., Sioux City, Iowa. European butterflies. 1113 (X).
WIGHT and HENNE, Salina, Kans. Clay. (Returned.) 948 (XVII).
WILEMAN, E. D., Massillon, Ohio. Worm. 1039 (X).
WILLARD, CHARLES D., Cottonwood, Ariz. Mineral. 881 (XVI).
WILMOTH, H. C., Washington, D. C. (through Hon. William L. Wilson). Ores. 1057 (XVI).
WINCH BROTHERS, Boston, Mass. Insect, and a pair of shoes showing injury done by the insect. 1138 (X).
WILSON, Hon. J. H., House of Representatives. Six specimens of minerals. 807 (XVI).
WILSON, J. S., Stillman, Va. Mineral (through Hon. G. W. Atkinson). 1003 (XVI).
WILSON, WILLIAM, Welch, Va. Mineral. 818 (XVI).
WILSON, Hon. WILLIAM L. (See under H. C. Wilmoth.)
WILVERT, E., Sunbury, Pa. Ores and a mineral. 835, 846, 848, 930, 956, and 1236 (XVI, XVII).
WITTKUGEL, ERICH, San Pedro Sula, Honduras. Birds' skins and mammal skins. 1065, 24394 (IV, V, A).
WILLIAMS, A. J. Specimen of fungus from Florida. 803 (XV).
WITHROW, Dr. J. M., La Luz, N. Mex. Rock. 978 (XVII).
WOOD, Albert, North Bristol, Ohio. Stone. 924 (XVII).
WORRALL, WILLIAM, St. Louis, Mo. Fish. (Returned.) 1174 (VII).
WORTHEN, C. K., Warsaw, Ill. Thirty-three skins and skulls of mammals. (Purchased.) 862 (24069) (IV). Two skins of raccoon. (Purchased.) 926 (24068) (IV). Thirty-three specimens representing 27 species of birds' skins from various localities. (Returned.) 975 (V, A). Specimens of reptiles from Texas, 1077 (24410) (VI). Mammal skins. 1099 (24265) (IV).
WRIGHT, D. W. M. (See under L. R. Price.)

WRIGHT, SAMUEL H., Longview, Tex. Specimen of mineral ore. 805 (XVII).
WRIGHT, S. P., Elkader, Kans. Three specimens of rocks. 804 (XVII).
YEATTS, L. K., Ella, Va. Ores. (One sample returned.) 1004 (XVII). Minerals, 1019 (XVI). Ores, 1048, 1097 (XVII).
YOUNG, J. R., Windom, N. C. Minerals, 808, 833, 1027, 1238 (XVI).
ZEIGLER, F. A., Boyd's Station, Md. Ores, 838 (XVII).
ZIPP, E. H., Capon Bridge, W. Va. Specimen of supposed kaolin. 893 (XVII).
ZUBERBIER, A. W., Logan, Minn. Specimen of petrified nut. (Returned.) 1111 (XIV).

Index to list of specimens sent for examination and report, arranged geographically.

Source.	Number of lot.	Total.
North America:		
British America	839, 890, 895, 1169, 1209	5
Central America	1085	1
Mexico	861, 1226	2
United States:		
Alabama	928, 1010, 1139	3
Arizona	800, 852, 881, 900, 966, 1033, 1046, 1130, 1149, 1247	10
Arkansas	809, 817, 925, 972, 1065, 1106	6
California	820, 861, 912, 921, 945, 946, 947, 961, 979, 983, 997, 1007, 1032, 1108, 1112, 1158, 1191, 1214	18
Colorado	880, 904, 918, 952, 1023, 1168, 1220	7
Connecticut	883, 1220	2
District of Columbia	807, 810, 824, 903, 954, 1057	6
Florida	798, 803, 831, 853, 873, 874, 892, 955, 1083, 1201, 1211	11
Georgia	857, 869, 922, 943, 1059, 1080, 1081, 1104, 1109	10
Idaho	1133, 1160, 1170, 1173, 1208, 1244	6
Illinois	801, 819, 843, 862, 864, 885, 891, 909, 926, 968, 975, 994, 1066, 1073, 1077, 1099, 1152, 1156, 1185, 1187, 1243	21
Indiana	811, 1096, 1178	3
Indian Territory	1135, 1171	2
Iowa	901, 918, 1001, 1025, 1063, 1086, 1113, 1119, 1224, 1232, 1234	11
Kansas	804, 948, 1016, 1076, 1088, 1102, 1105, 1144, 1147, 1154, 1164, 1177, 1188	13
Kentucky	837, 872, 889, 908, 950, 973, 980, 988, 1011, 1041, 1110, 1167, 1246	13
Louisiana	870, 886, 1058, 1183, 1231	5
Maine	987	1
Maryland	828, 887, 933, 960, 965, 977, 1013, 1087	8
Massachusetts	815, 836, 859, 1072, 1100, 1115, 1138, 1189, 1237	9
Michigan	826, 851, 867, 1005, 1056, 1157, 1162, 1192	8
Minnesota	799, 866, 1103, 1111, 1122, 1215	6
Mississippi	841, 842, 878, 1128, 1131	5
Missouri	822, 896, 923, 949, 1091, 1121, 1165, 1174, 1245	9
Montana	929, 982, 1062, 1891, 1125	5
Nebraska	1142, 1233, 1241	3
Nevada	898	1
New Jersey	802, 858, 863, 990, 1008, 1020, 1022, 1068, 1117, 1175, 1176	11
New Mexico	978, 981, 1050, 1051, 1060, 1095, 1178	7
New York	812, 838, 868, 882, 916, 938, 944, 953, 957, 964, 993, 1002, 1006, 1047, 1074, 1078, 1118, 1137, 1140, 1146, 1155, 1159, 1190, 1206, 1230, 1239	26
North Carolina	808, 833, 834, 849, 856, 919, 1026, 1027, 1191, 1198, 1229, 1238	12
North Dakota	1213	1
Ohio	872, 879, 884, 920, 924, 951, 959, 962, 1036, 1039, 1040, 1064, 1071, 1075, 1082, 1134, 1205, 1212, 1216, 1222, 1223, 1228	22
Oklahoma Territory	1227	1
Oregon	861, 913	2

Index to list of specimens sent for examination and report, etc.—Continued.

Source.	Number of lot.	Total.
United States—Continued.		
Pennsylvania	835, 846, 848, 873, 876, 894, 910, 911, 917, 930, 956, 995, 971, 1009, 1015, 1038, 1067, 1089, 1120, 1136, 1143, 1153, 1180, 1196, 1200, 1204, 1207, 1236, 1242	29
South Carolina	854, 915, 942, 1029, 1054, 1079, 1098, 1141, 1193	9
South Dakota	899, 1037, 1114, 1123, 1210, 1235	6
Tennessee	832, 840, 845, 875, 905, 906, 927, 936, 937, 1012, 1014, 1030, 1035, 1055, 1069, 1092, 1093, 1094, 1129, 1148, 1150, 1166, 1172, 1179, 1180, 1203	26
Texas	805, 813, 816, 829, 844, 907, 934, 935, 967, 1061, 1132, 1151, 1161, 1182, 1184, 1194, 1197, 1202, 1218	19
Utah	877, 931, 958, 970, 985, 986, 991, 1024, 1042, 1049, 1052, 1084, 1145, 1168	14
Virginia	797, 806, 818, 823, 825, 827, 847, 855, 860, 888, 902, 932, 969, 984, 989, 992, 999, 1004, 1017, 1018, 1019, 1043, 1044, 1048, 1097, 1101, 1124, 1195, 1217	29
Washington	814, 830, 871, 897, 939, 974, 976, 1031, 1034	9
West Virginia	850, 865, 893, 941, 963, 996, 1003, 1021, 1028, 1070, 1107, 1219, 1221, 1225, 1240	15
Wisconsin	1126	1
Wyoming	821, 1045, 1127, 1199	4
Europe:		
Turkey	1053	1
Africa:		
Egypt	1000	1
Asia	998	1
Asia Minor	1116	1

FOREIGN EXCHANGES.

Exchanges of duplicate specimens with foreign museums have been continued in accordance with the custom which has prevailed in past years. The record of domestic exchanges is shown in the accession list (Section V), and the exchanges made with persons and scientific institutions abroad are referred to in the following statement.

ARTS AND INDUSTRIES.

Mr. Charles Gindriez, director of the museum at Chalon sur Saône, France, transmitted an impression from a heliograph "Portrait of Cardinal Amboise" prepared from an engraving by Briot, made by Joseph Nicephore Niepce in 1824, for which a collection of archæological objects was sent in exchange.

From the Royal Botanical Gardens, Kew, England (through Dr. W. T. Thiselton-Dyer, director), was received a collection of Indian and textile fabrics, samples of miscellaneous drugs, and a collection of seeds. Ethnological objects and bogus coffee beans were sent in exchange.

ETHNOLOGY.

From the British Museum, London, England, were received twenty-five ethnological objects from Kaffirland, South Africa, in exchange for specimens of the same character.

Mr. Henry Balfour, of the Museum, Oxford, England, transmitted models of a shell lamp from the southwest coast of Brittany, and from the Orkney and Shelter islands; also a French crusie of brass from Normandy; two iron lamps used by bakers for lighting ovens, and a spoon made from a pecten shell. In exchange a blowgun of cane from the Chetimacha Indians, Louisiana, model of fire-drill from the Eskimos of Anderson River, Canada, and a pottery lamp from Morgantown, W. Va., were transmitted.

Several small exchanges of ethnological objects have been made with Mr. Edward Lovett, of Croydon, England.

From the Royal Botanical Gardens, Kew, England (through Dr. W. T. Thiselton-Dyer, director), was received a mat from New Guinea, for which an equivalent has been transmitted.

The Museum, Oxford, England, through Mr. Henry Balfour, transmitted a bamboo blow-pipe from Burmah, for which an equivalent will soon be sent.

PREHISTORIC ANTHROPOLOGY.

From the University of New Brunswick, Fredericton, New Brunswick, through Mr. L. W. Bailey, were received three stone implements and other specimens, for which twenty-six stone implements and six fragments of pottery were sent in exchange.

Exchanges of archæological material have been made with Mr. Edward Lovett, of Croydon, England.

A collection of archæological objects was transmitted to the Museo Nazionale d'Anthropologia, Florence, Italy, for which an equivalent will doubtless be received before long.

MAMMALS.

Dr. R. Collett, director of the Zoölogical Museum, Christiania, Norway, transmitted a skeleton of a porpoise (*Lagenorhynchus albirostris*), for which the skin and model of skull of a California sea-lion will be sent in exchange.

Seventy-one specimens of mammals were sent to the Auckland Museum, Auckland, New Zealand, for which an equivalent has been promised.

A skin and skull of *Antilocapra americana*, and skull of *Bison americanus*, has been transmitted to the Australian Museum, Sydney, New South Wales, for which material has been promised in exchange.

To Dr. George Pouchet, Musée d'Histoire Naturelle, Paris, France, was sent a skeleton of *Bison americanus*, in exchange for objects already received.

BIRDS.

Mr. W. Eagle Clarke, Edinburgh Museum of Science and Art, Edinburgh, Scotland, sent eleven specimens, representing nine species, of birds' skins from England, Azores Islands, Siberia, and Japan, for which an exchange will be sent.

From the National Museum of Costa Rica, San José, Costa Rica, through Mr. George K. Cherrie, were received sixty-five birds' skins, representing thirty-five species from Costa Rica, including types of two new species and one new genus, two species new to the collection, and plumages previously unrepresented, for which a collection of birds' skins was transmitted in exchange.

Ten specimens of birds' skins have been transmitted, in exchange, to the Auckland Museum, Auckland, New Zealand.

To Dr. George Pouchet, Musée d'Histoire Naturelle, Paris, France, have been sent four skeletons of birds, in return for material received.

REPTILES AND BATRACHIANS.

A collection of reptiles and batrachians was sent to the Auckland Museum, Auckland, New Zealand, for which specimens have been promised in return.

FISHES.

From the Royal Zoölogical Museum, Copenhagen, Denmark (through Prof. Dr. Chr. Lütken, president), were received four species of fishes, including *Liparis fabricii*, *Lycoden lütkeni*, *Icelus hamatus*, and *Aspidophoroides olrikii*, for which an exchange of deep-sea forms will be prepared for transmission.

The skin of a specimen of *Lepidosteus osseus* has been transmittted to the Australian Museum, Sydney, New South Wales, for which an equivalent has been promised.

MOLLUSKS.

To Dr. Hugh Fulton, South Kensington, England, were sent four specimens of *Voluta stearnsii*, in exchange for exotic shells previously received.

From the Royal Zoölogical Museum, Copenhagen, Denmark (through Prof. Dr. Chr. Lütken, president), were received twenty-seven specimens of marine shells, representing eleven species, for which an exchange will be sent.

A collection of North American Unionidæ has been sent to Dr. H. Von Ihering, Grande do Sul, Brazil, in exchange for a collection of South American shells already received.

INSECTS.

From Mr. J. H. Brady, Cape Town, South Africa, were received one hundred and sixty-seven species of South African insects, for which thirty-three species of coleoptera and other insects were sent in exchange.

Alcoholic specimens of Myriapods were sent to Mr. O. F. Cook, Orillia, Ontario, Canada, in exchange for specimens which have been promised.

Mr. Paul Noël, of Rouen, France, transmitted fourteen species of European *Caribidæ*, for which an exchange will be sent.

MARINE INVERTEBRATES.

From the Royal Museum of Natural History, Berlin, Germany, (through Dr. Karl Möbius, director) was received a collection of echinoderms from Europe, South America, Asia, and the East Indies, for which one hundred and fifty specimens of echinoderms, representing forty-two species, were sent in exchange.

From the Royal Zoölogical Museum, Copenhagen, Denmark (through Prof. Dr. Chr. Lütken), was received a collection of marine invertebrates, for which a collection will be prepared in exchange.

Dr. Charles F. Newcombe, secretary of the Natural History Society of British Columbia, Victoria, transmitted a small collection of dried crustaceans from British Columbia, and an alcoholic specimen of *Gebia pugettensis* with Lepton attached, for which an exchange will be sent.

Prof. George S. Brady, Mowbray Villa, Sunderland, England, has been sent specimens of echinoderms and corals, for which an equivalent has been promised.

INVERTEBRATE FOSSILS (PALEOZOIC.)

From the Geological Survey of Sweden, Stockholm, Sweden, were received fifty-one specimens of Cambrian fossils in exchange for specimens already sent.

From the University of New Brunswick, Fredericton, New Brunswick (through Mr. L. W. Bailey), were received ten specimens of Canadian fossils, for which an equivalent has been transmitted.

FOSSIL PLANTS.

From the University of New Brunswick, Fredericton, New Brunswick (through Mr. L. W. Bailey), were received fossils plants, for which specimens were sent in exchange.

Twenty-two specimens of fossil plants have been sent to Mr. Isaac Earnshaw, Oldham, England, in exchange for plants already received.

BOTANY.

From the Royal Botanic Garden, Calcutta, India (through Dr. G. King, superintendent), were received specimens of dried plants from India, for which an exchange will be sent.

Dr. I. Hagen, Trondjhem, Norway, transmitted specimens of Norwegian mosses, for which an exchange will be prepared.

Prof. A. G. Nathorst, of the Royal Academy of Science, Stockholm, Sweden, sent a collection of Arctic mosses in exchange for one hundred specimens of dried ferns from the United States and Costa Rica, previously sent.

Prof. T. M. Fries, Upsala, Sweden, was sent eight hundred species of dried plants from the United States, for which an equivalent will be received.

MINERALS.

From the University of New Brunswick, Fredericton, New Brunswick (through Mr. L. W. Bailey), were received specimens of minerals, in exchange for material sent.

Mr. H. J. Johnston-Lavis, of Naples, Italy, transmitted eleven specimens of minerals, for which an exchange of eighteen specimens of miscellaneous minerals was sent.

From the Royal Saxon Mining Academy, Frieberg, Saxony, were received fifty-five specimens of minerals, for which a collection, consisting of forty-four specimens of miscellaneous minerals, was sent in exchange.

GEOLOGY.

From the University of New Brunswick, Fredericton, New Brunswick (through Mr. L. W. Bailey), were received specimens of geological material, for which an exchange has been sent.

Sixteen specimens of minerals have been sent to the Auckland Museum, Auckland, New Zealand, as an exchange for material which has been promised.

Mr. H. J. Johnston-Lavis, of Naples, Italy, sent a small series of eruptive rocks from Mount Vesuvius, for which specimens of rocks were sent in exchange.

From Mr. B. Sturtz, of Bonn, Prussia, were received fifty-five specimens of rocks from European sources, for which ninety-three specimens of rocks were sent in exchange. Mr. Sturtz also sent specimens of ores, for which an exchange will be prepared and forwarded.

Four specimens of rocks were sent, in exchange, to Prof. P. Groth, Munich, Bavaria, for which an equivalent has been promised.

PUBLICATIONS.

In the report of the National Museum for 1889 the subject of the publications of the National Museum is treated at some length. It is therefore not considered necessary to review *in extenso* this branch of the work in this report.

It is proper to remark that the work of issuing the publications of the Museum is now being more punctually performed than heretofore. The report for 1889 has been published, and the report for 1890 has been in type for several months. Volume XIII of Proceedings of the National Museum (for 1890) is in type, and all the papers of volume XIV (for 1891) have been issued separately and distributed, although the volume in bound form has not yet appeared.

In the case of the "Bulletin," No. 38 has been published during the last fiscal year, and some of the parts of Bulletin 39 are now being distributed. Before long Bulletins 40, 41, and 42 will be published.

During the last session of Congress an appropriation of $15,000 was made for printing the report and other publications of the Museum,

being an increase of $5,000 over the preceding year. This will render possible a somewhat wider distribution of the "Proceedings" and "Bulletin," though the increased number of copies is still far from sufficient to meet all legitimate demands.

REPORTS OF THE NATIONAL MUSEUM.

The Museum report for 1888 was issued during the current year, and those for 1889 and 1890 are now in type. The delay in issuing the last two reports has been occasioned by the overcrowded condition of the Government Printing Office and the increased amount of engraving needed for these reports. The report for 1888 contains xxii + 876 pages. The following special papers, based upon collections in the Museum, are published in this report:

1. The Coast Indians of Southern Alaska and Northern British Columbia. By Lieut. Albert P. Niblack, U. S. Navy.
2. A catalogue of the Hippisley collection of Chinese Porcelains, with a sketch of the history of the ceramic art in China. By Alfred E. Hippisley (of the Imperial Chinese customs service).
3. The expedition to Funk Island, with observations upon the history and anatomy of the Great Auk. By Frederic A. Lucas.
4. Fire-making Apparatus in the U. S. National Museum. By Walter Hough.
5. The collection of Korean mortuary pottery in the U. S. National Museum. By Pierre Louis Jouy.
6. A study of prehistoric anthropology. By Thomas Wilson.
7. Ancient Indian matting, from Petit Anse Island, Louisiana. By Thomas Wilson.
8. Results of an inquiry as to the existence of man in North America during the paleolithic period of the stone age. By Thomas Wilson.

PROCEEDINGS OF THE U. S. NATIONAL MUSEUM.

The papers published in the "Proceedings" consist chiefly of technical descriptions of specimens, prepared by the curators of the National Museum or by other investigators, founded upon the collections in the National Museum. Vol. XII of the "Proceedings" was issued in November, 1890, although a few unbound copies were printed before the end of the previous fiscal year. It contains 686 pages (23 plates, 19 text figures) and embraces 32 papers by 26 authors, 10 of whom are connected with the National Museum. A list of the papers is given on pp. 54–56 of the last report. The papers relate to the following subjects:

Subject.	No. of papers.	Subject.	No. of papers.
Archæology	2	Mammals	1
Birds	6	Marine invertebrates	1
Fishes	5	Molluska	1
Fossil invertebrates	2	Osteology	1
Fossil plants	1	Recent plants	1
Geology	1	Reptiles	3
Insects	7		

Vol. XIII of the "Proceedings" was put in type during the fiscal year, but was not issued until after June 30. It includes 52 papers, comprising separates 790 to 841. The titles of the separate papers, with the names of the authors, are here given:

No. 790. Description of a new species of land shell from Cuba—*Vertigo Cubana*. By William H. Dall. Pp. 1-2.

No. 791. Description of a new species of fish from Tippecanoe River, Indiana. By David Starr Jordan and Barton Warren Evermann. Pp. 3, 4.

No. 792. Remarks on some fossil remains considered as peculiar kinds of marine plants. By Leo Lesquereux. Pp. 5–12.

No. 793. On certain Mesozoic fossils from the islands of St. Paul and St. Peter, in the Straits of Magellan. By Charles A. White. Pp. 13, 14.

No. 794. Notes on the leaves of Liriodendron. By Theodore Holm. Pp. 15–35.

No. 795. New fishes collected off the coast of Alaska and the adjacent regions southward. By Tarleton H. Bean. Pp. 37–45.

No. 796. Preliminary report on the fishes collected by the steamer *Albatross* on the Pacific coast of North America during the year 1889, with description of twelve new genera and ninety-two new species. By Charles H. Gilbert. Pp. 49–126.

No. 797. Further notes on the genus Xiphocolaptes of Lesson. By Robert Ridgway. Pp. 47, 48.

No. 798. Catalogue of skeletons of birds collected at the Abrolhos Islands, Brazil, the Straits of Magellan, and the Galapagos Islands, in 1887–'88. By Frederic A. Lucas. Pp. 127–130.

No. 799. Birds from the coasts of Western North America and adjacent islands, collected in 1888–'89, with descriptions of new species. By Charles H. Townsend. Pp. 131–142.

No. 800. Reptiles from Clarion and Socorro islands and the Gulf of California, with description of a new species. By Charles H. Townsend. Pp. 143, 144.

No. 801. Plants collected in 1889 at Socorro and Clarion islands, Pacific Ocean. By Dr. George Vasey and J. N. Rose. Pp. 145–149.

No. 802. On a new genus and species of Colubrine snake from North America. By Leonhard Stejneger. Pp. 151–155.

No. 803. The osteological characteristics of the family Anguillidæ. By Theodore Gill. Pp. 157–160.

No. 804. The osteological characteristics of the family Synaphobranchidæ. By Theodore Gill. Pp. 161–164.

No. 805. The osteological characteristics of the family Muraenidæ. By Theodore Gill. Pp. 165–170.

No. 806. On the disappearance of the Dick Cissel (*Spiza Americana*) from the District of Columbia. By Hugh M. Smith. Pp. 171, 172.

No. 807. Description of a new species of bat, *Atalapha semota*. By Harrison Allen. Pp. 173–175.

No. 808. On the snakes of the genus Charina. By Leonhard Stejneger. Pp. 177–182.

No. 809. On the North American lizards of the genus Barissia of Gray. By Leonhard Stejneger. Pp. 183–185.

No. 810. A collection of stone implements from the District of Columbia. By S. V. Proudfit. Pp. 187–194.

No. 811. Notes on the occurrence of a young crab-eater (*Elacate Canada*) from the Lower Hudson Valley, New York. By Dr. A. K. Fisher. Pp. 195, 196.

No. 812. Observations on the life history of the Bottlenose Porpoise. By Frederick W. True. Pp. 197–203.

No. 813. Description of new West American land, fresh water, and marine shells, with notes and comments. By Robert E. C. Stearns. Pp. 205–225.

No. 814. Description of two new species of mammals from Mount Kilima-Njaro, East Africa. By Frederick W. True. Pp. 227–229.

No. 815. Osteological characteristics of the family Muraenesocidæ. By Theodore Gill. Pp. 231–234.

No. 816. On the family Ranicipitidæ. By Theodore Gill. Pp. 235–238.

No. 817. The osteological characteristics of the family *Simenchelyidæ*. By Theodore Gill. Pp. 239–242.

No. 818. The characteristics of the Dactylopteroidæ. By Theodore Gill. Pp. 243–248.

No. 819. Notes on the birds observed during the cruise of the U. S. Fish Commission schooner *Grampus*, in the summer of 1887. By William Palmer. Pp. 249–265.

No. 820. Description of new forms of Upper Cambrian fossils. By Charles D. Walcott. Pp. 266–279.

No. 821. Notes on Triassic plants from New Mexico. By W. M. Fontaine and F. H. Knowlton. Pp. 281–285.

No. 822. Notes on fishes of the genera Agosia, Algansea, and Zophendum. By David Starr Jordan. Pp. 287, 288.

No. 823. Description of a new species of Etheostoma (*E. micropterus*) from Chihuahua, Mexico. By Charles H. Gilbert. Pp. 289, 290.

No. 824. Description of a new species of bat of the genus Carollia, and remarks on *Carollia brevicauda*. By Harrison Allen. Pp. 291–298.

No. 825. Osteological characteristics of the family Amphipnoidæ. By Theodore Gill. Pp. 299–302.

No. 826. Description of a new species of mouse, *Phenacomys longicaudus*, from Oregon. By Frederick W. True. Pp. 303, 304.

No. 827. Notes on the habits of the moose in the far north of British America in 1865. By J. G. Lockhart. Pp. 305–308.

No. 828. Observations on the Farallon Rail. By Robert Ridgway. Pp. 309–311.

No. 829. List of fishes obtained in the harbor of Bahia, Brazil, and in adjacent waters. By David Starr Jordan. Pp. 313–336.

No. 830. Notes on the osteology of the Paridæ, Sitta, and Chamæa. By Frederic A. Lucas. Pp. 337–345.

No. 831. Notes on the Aspredinidæ. By Theodore Gill. Pp. 347–352.

No. 832. Note on the genus Felicthys of Swainson. By Theodore Gill. Pp. 353, 354.

No. 833. The characteristics of the family of Scatophagoid fishes. By Theodore Gill. Pp. 355–360.

No. 834. On the relations of Cylopteroidea. By Theodore Gill. Pp. 361–376.

No. 835. The osteological characteristics of the family Hemitripteridæ. By Theodore Gill. Pp. 377–380.

No. 836. Playing cards from Japan. By Mrs. J. King Van Rensselaer. Pp. 381, 382.

No. 837. Notes on North American Myriapoda of the family Geophilidæ, with descriptions of three genera. By O. F. Cook and G. N. Collins. Pp. 383–396.

No. 838. Contributions toward a monograph of the Noctuidæ of temperate North America. Revision of Homohadena, Grote. By John B. Smith. Pp. 397–405.

No. 839. Contributions toward a monograph of the Noctuidæ of temperate North America. Revision of the species of Hadena referable to Xylophasia and Luperina. By John B. Smith. Pp. 407–447.

No. 840. A supplementary list of fishes collected at the Galapagos Islands and Panama, with description of one new genus and three new species. By Charles H. Gilbert. Pp. 449–455.

No. 841. The Birds of Manitoba. By Ernest E. Thompson. Pp. 457–643.

These papers may be classified under the following subjects:

Subject.	No. of papers.	Subject.	No. of papers.
Archæology	1	Insects	3
Birds	8	Mammals	6
Ethnology	1	Molluska	2
Fishes	21	Recent plants	2
Fossil invertebrates	3	Reptiles	4
Fossil plants	1		

Vol. XIV of the Proceedings is now in the hands of the printer, about 300 pages being in type, including papers 842 to 850.

"BULLETIN" OF THE NATIONAL MUSEUM.

Bulletin 38, which was put in type during the preceding fiscal year, was received from the Public Printer on July 25, 1891. This bulletin, consisting of 227 pages, is entitled "Contributions towards a monograph of the Insects of the Lepidopterous family Noctuidæ of Temperate North America—Review of the species of the genus Agrotis," by John B. Smith.

The manuscript of Parts A, B, C, D, and E of Bulletin 39 were sent to the Public Printer in May and June, 1891, but none of these parts were issued until after July 1. This bulletin under the general title "Instructions to Collectors" will be published in parts as fast as printed, and the parts may finally be combined and issued as one or more bound volumes. The papers to be included, thus far prepared, are as follows:

Part A, Directions for collecting specimens of birds. By Robert Ridgway. Part B, Directions for collecting fossil and recent plants. By F. H. Knowlton. Part C, The preparation of rough skeletons. By F. A. Lucas. Part D, Directions for collecting birds' eggs. By Capt. Charles Bendire. Part E, Directions for collecting reptiles and batrachians. By Dr. Leonhard Stejneger.

The manuscript of Bulletin 40, Bibliography of George N. Lawrence, and of Bulletin 41, Bibliography of Dr. Charles Girard, was sent to the Public Printer on May 28.

The manuscript of "Special Bulletin No. 1"—the first quarto publication undertaken by the Museum—was sent to the Public Printer early in May, and 184 printed pages were revised before July 1. This bulletin is by Capt. Charles Bendire, U. S. Army, and is entitled "Life Histories of North American Birds, with special reference to their breeding habits and eggs." This work will be illustrated with chromo-lithographic plates.

The first annual report of the American Historical Association (1889) was printed during the year, and the report for 1890 was transmitted to the printer. This association was founded in 1884 for the promotion

of historical studies and the collection and preservation of historical manuscripts. By act of Congress in January, 1889, the Regents of the Smithsonian Institution were authorized to permit the Association to deposit its collections in the Museum.

A large number of papers upon scientific subjects have been published by officers of the Museum and other specialists. These are for the most part based on collections in the Museum, and are referred to by title in the Bibliography, constituting Section IV of this report. The authors of these papers are seventy-nine in number, thirty-three of whom are connected with the Smithsonian Institution or the National Museum. The papers number three hundred and forty-six, and relate to the following subjects:

Subjects.	By Museum officers.	By other investigators.	Total.
American aboriginal pottery	1	0	1
Archæology	7	1	8
Astronomy	1	0	1
Biography	4	0	4
Birds	15	20	35
Chemistry	7	1	8
Comparative anatomy	1	2	3
Ethnology	9	1	10
Exploration	1	1	2
Fisheries and fish-culture	34	0	34
Fishes	37	22	59
Fossils	4	2	6
Geography	2	0	2
Geology	10	2	12
Graphic arts	7	0	7
Historical collections	1	0	1
Insects	32	8	40
Mammals	6	5	11
Marine invertebrates	2	0	2
Materia medica	1	0	1
Metallurgy	0	1	1
Mineralogy	1	1	2
Mollusks	18	0	18
Oölogy	1	0	1
Oriental antiquities	2	0	2
Osteology	3	0	3
Plants	38	5	43
Reptiles and batrachians	7	5	12
Transportation and engineering	3	0	3
Miscellaneous	13	1	14
Total	268	78	346

VISITORS.

During the year the total number of visitors to the Museum building was 286,426, and to the Smithsonian Institution 111,669.

The monthly register of visitors during the last fiscal year is as follows:

Year and month.	National Museum building.	Smithsonian building.
1890.		
July	17,788	8,298
August	32,138	11,435
September	25,329	10,365
October	21,323	9,731
November	21,715	7,783
December	18,762	8,227
1891.		
January	24,005	8,262
February	26,825	10,458
March	26,112	10,019
April	26,294	9,767
May	25,072	8,832
June	21,063	8,492
	286,426	111,669
Approximate daily average on a basis of 313 days in the year	921	346

Table showing the number of visitors to the Museum and Smithsonian buildings since the opening of the former in 1881.

Year.	Museum building.	Smithsonian building.	Total number of visitors to both buildings.
1881	150,000	.....	150,000
1882	167,455	152,744	320,199
1883	202,188	104,823	307,011
1884	195,322	91,130	286,452
1885 (January–June)	107,365	60,428	167,793
1885–'86	174,225	88,960	263,185
1886–'87	216,562	98,552	315,114
1887–'88	249,665	102,863	352,528
1888–'89	374,843	149,618	524,461
1889–'90	274,324	120,894	395,218
1890–'91	286,426	111,669	398,095
Total	2,398,375	1,081,681	3,480,056

LECTURES AND MEETINGS OF SOCIETIES.

Following the practice of previous years, the lecture hall of the Museum has been granted for lectures and meetings of numerous scientific societies. A statement of the meetings held between July, 1890, and July, 1891, is appended.

1890.

Photographers' Association, August 12–15.

Association of Official Agricultural Chemists (eighth meeting), August 28.

American Ornithologists Union, November 18–20.

American Historical Association (seventh annual meeting), December 29–31.

Joint meeting of the American Economic Association and the American Forestry Association, December 30.

1891.

National Dairy and Food Commissioners' Association, January 14 and 15.
National Geographic Society, March 13, April 10, April 24, May 1, May 29.
National Academy of Sciences, April 21.

The usual course of Saturday lectures was omitted this year. Mr. Thomas Wilson, curator of prehistoric anthropology, gave a series of eight lectures. The first four lectures related to art and architecture of prehistoric times. These were delivered on February 4, 7, 11, 14. The other four were as follows: May 13, Prehistoric Anthropology at the French Exposition. May 16, Ancient Industries, Charms and Amulets (illustrated); May 21, History of Human Habitations (illustrated); May 23, Anthropological Congresses and Prehistoric Museums.

STUDENTS.

It has always been one of the aims of the National Museum to aid students and others engaged in scientific work by lending them material to be used in connection with their scientific researches. The following statement has reference to the more important transactions of this kind during the year: skins, alcoholics, and skulls of North American rodents were sent to Dr. J. A. Allen, American Museum of Natural History, New York; a series of bats to Dr. Harrison Allen, Philadelphia, Pa.; skulls of otters and badgers to Dr. E. A. Mearns, U. S. Army, Fort Snelling, Minn.; bird-skeletons to Dr. R. W. Shufeldt, Takoma Park, D. C.; bird-skins to Mr. George N. Lawrence, New York city, N. Y.; South American Devonian fossils to Prof. J. M. Clarke, Albany, N. Y.; turtles to Dr. G. Baur, Clark University, Worcester, Mass.; fishes to Prof. D. S. Jordan, Bloomington, Ind.; invertebrate fossils to Dr. W. B. Clark, Johns Hopkins University, Baltimore, Md.; mammal-skins to Walter E. Bryant, California Academy of Sciences, San Francisco, Cal.; geological material to the Geological Survey of Arkansas; crustaceans to Prof. H. A. Ward, Rochester, N. Y.; stone implements to the Bureau of Ethnology, Washington, D. C.; bird-skins to William Brewster, Cambridge, Mass.; rocks to Prof. H. D. Campbell, of Washington and Lee University, Lexington, Va.; bird-skins to C. B. Cory, Boston, Mass.; bird-skins to American Museum of Natural History, New York; clays and earth to Dr. A. M. Edwards, Newark, N. J.; lizards to Prof. E. D. Cope, Philadelphia, Pa.

Several students have availed themselves of the privilege of examining the collections in the Museum. Dr. George K. Cherrie, ornithologist of the Costa Rica National Museum, has examined the collection of Costa Rica birds, and a similar opportunity was also afforded to Mr. Charles A. Keeler, of Berkeley, Cal., while engaged in a special investigation of the origin of color in birds. Dr. O. P. Hay, of Irvington, Ind., spent several weeks in the department of reptiles and

batrachians, studying the material bearing upon the herpetology of Indiana.

SPECIAL RESEARCHES BY CURATORS AND OTHERS.

The curators of the Museum in addition to their regular duties have made special studies of the collections under their charge, and these investigations have resulted in the publication of several important and interesting papers in the publications of the Smithsonian Institution and the National Museum. During the first three years of the occupancy of the Museum building, or from 1881 to 1884, the Reports of the Museum were very limited in extent, owing to the fact that the collections had not been properly arranged for study; but during and since 1884 a large number of special studies of collections have been made both by the curators and by collaborators of the Museum. These results have been for the most part published in the Annual Reports and in the "Proceedings" of the Museum. The following list represents the papers published in the Museum reports, commencing with 1884:

1884.

Throwing-sticks in the National Museum. By Otis T. Mason.

Basket-work of the North American Aborigines. By Otis T. Mason.

A study of the Eskimo Bows in the U. S. National Museum. By John Murdoch.

On a Spotted Dolphin, apparently identical with the *Prodelphinus doris* of Gray. By Frederick W. True.

The Florida Muskrat, *Neofiber Alleni* True. By Frederick W. True.

On the West Indian Seal, *Monachus tropicalis* Gray. By Frederick W. True and F. A. Lucas.

1885.

The George Catlin Indian Gallery in the U. S. National Museum, with Memoir and Statistics. By Thomas Donaldson.

1886.

The Meteorite Collection, a catalogue of meteorites represented November 1, 1886. By F. W. Clarke.

The Gem Collection. By George F. Kunz.

The Collection of Building and Ornamental Stones; a handbook and catalogue. By George P. Merrill.

The Collection of Textiles; List of Fibers and Fabrics. By Romyn Hitchcock.

Preparation of Microscopical Mounts of Vegetable Textile Fibers. By Romyn Hitchcock.

How to collect Mammal Skins for Purposes of Study and for Mounting. By William T. Hornaday.

1887.

Cradles of the American Aborigines. By Otis T. Mason.

Notes on the artificial deformation of children among savage and civilized peoples. By Dr. J. H. Porter.

The Human Beast of Burden. By Otis T. Mason.

Ethno-Conchology. A study of Primitive Money. By Robert E. C. Stearns.

A Preliminary Catalogue of the Eskimo Collection in the U. S. National Museum, arranged geographically and by uses. By Lieut. T. Dix Bolles, U. S. Navy.

The Extermination of the American Bison, with a sketch of its discovery and life-history. By William T. Hornaday.

The Preservation of Museum specimens from insects and the effect of dampness. By Walter Hough.

1888.

The Coast Indians of Southern Alaska and Northern British Columbia. By Lieut. Albert P. Niblack, U. S. Navy.

A Catalogue of the Hippisley Collection of Chinese Porcelain, with a sketch of the history of the ceramic art in China. By Alfred E. Hippisley, of the Imperial Chinese customs service.

The Expedition to Funk Island, with observations upon the history and anatomy of the Great Auk. By Frederick A. Lucas.

Fire-making Apparatus in the U. S. National Museum. By Walter Hough.

The Collection of Korean Mortuary Pottery in the U. S. National Museum. By Pierre Louis Jouy.

A study of Prehistoric Anthropology. By Thomas Wilson.

Ancient Indian Matting; from Petit Anse Island, Louisiana. By Thomas Wilson.

Results of an inquiry as to the existence of man in North America during the paleolithic period of the stone age. By Thomas Wilson.

1889.

The Museums of the Future. By G. Brown Goode.

The Ethnology and Antiquities of Easter Island. By William J. Thomson, paymaster, U. S. Navy.

Aboriginal Skin-dressing. By Otis T. Mason.

The Puma or American lion. By Frederick W. True.

Animals recently extinct or threatened with extermination. By Frederic A. Lucas.

The development of the American rail and track, as illustrated by the collection in the U. S. National Museum. By J. Elfreth Watkins.

Explorations in Newfoundland and Labrador in 1887 made in connection with the cruise of the U. S. Fish Commission schooner *Grampus*. By Frederic A. Lucas.

On a bronze Buddha in the U. S. National Museum. By Charles De Kay.

1890.

The Humming Birds. By Robert Ridgway.

White-line engraving for relief printing in the fifteenth and sixteenth centuries. By S. R. Koehler.

The methods of fire-making. By Walter Hough.

The Ulu, or woman's knife, of the Eskimo. By Otis T. Mason.

The Ancient Pit-dwellers of Yezo. By Romyn Hitchcock.

The Ainos of Yezo, Japan. By Romyn Hitchcock.

Hand-book for the department of geology in the U. S. National Museum. Part 1. Geognosy. The Materials of the Earth's Crust. By George P. Merrill.

The Catlin collection of Indian paintings. By Dr. Washington Matthews, U. S. Army.

The Log of the *Savannah*. By J. E. Watkins.

Anthropology at the Paris Exposition. By Thomas Wilson.

A list of the special papers published in this Report will be found at the beginning of section III.

FINANCE, PROPERTY, SUPPLIES, AND ACCOUNTS.

The following statement relating to cases and other furniture, and to the supplies and accounts of the Museum for the fiscal year 1890–'91 has been prepared by Mr. W. V. Cox, chief clerk.

PRESERVATION OF COLLECTIONS.

The appropriation for preservation of collections for the fiscal year ending June 30, 1891, is $140,000. The disbursements are as follows:

For salaries or compensation, $117,300.52; for specimens, $6,211.40; for general supplies, $3,052,32; for stationery, $1,653.02; for books and periodicals, $825.40; for travel, $1,114.78; for freight and cartage, $1,862.57; a total of $132,020.01, which leaves an unexpended balance of $7,979.99 to meet outstanding liabilities June 30, 1891.

FURNITURE AND FIXTURES.

The appropriation for furniture and fixtures, 1891, is $25,000; the disbursements are as follows:

For salaries or compensation, $14,212.52; exhibition cases, with designs and drawings for same, $1,331; drawers, trays, boxes, etc., $448.08; frames, stands, miscellaneous woodwork, $330.52; office furniture and other fixtures, $588.22; lumber, paints, oils, brushes, $1,929.45; tools, glass, hard ware, brackets, and interior fittings for cases, $1,930,49; apparatus, glass jars, and vials, $146.42; plumbing, tin, lead, etc., $282.72; rubber tubing for rendering cases insect proof, $105.04; traveling expenses, $5; making a total of $21,309.46, and leaving a balance on hand of $3,690.54 to meet outstanding liabilities for cases, plate glass, lumber, etc.

Detailed list of cases, unit tables, fixtures, etc., made or furnished during the year by persons outside the Museum:

Three mahogany wall cases, $730; 2 mahogany double-width cases (for lay figures), $375; 2 unit tables, special size, $108; 1 mahogany case for shrike group, $50; mahogany cornice for Liverpool case, $15; 1 pine pedestal and shade, $17; designs and drawings for cases, $36; drawers, trays, boxes, etc., $448.08; frames, stands, miscellaneous woodwork, $330.52; office furniture and other fixtures, $588.22.

Lumber, needed supplies, fittings, etc., have been bought as follows: Lumber, $1,364.05; glass, $954.56; hardware and fittings for cases, $707.13; cloth, cotton, etc., linings for cases, $108.03; apparatus, $84.50; glass jars and vials, $61.92; tools, $73.67; paints, oils, brushes, $565.40; tin, lead, etc., $268.48: rubber tubing for rendering cases insect proof, $105.04; iron brackets for cases, $87.10: plumbing, $14.24; traveling expenses, $5.

Cases made in the Museum workshops during the year 1891:

Two mahogany table cases; 3 mahogany table cases with sloping tops; 7 walnut table cases; 6 book cases; 13 half unit insect-proof cases; 4 insect-proof storage cases, two of them with 50 compartments each; 13 tops for cases, sloping, upright, etc.; 9 card catalogue cases.

Cases repaired, remodeled, extended, and made insect proof by lining them with metal and fitting the doors with rubber tubing:

One wall case, department of vertebrate fossils, extended; 6 half unit cases, department of mammals, made insect proof; 53 quarter unit cases, department of ornithology, made insect proof; 5 table cases, department of botany, made insect proof; 3 table cases for special deposit, Department of Agriculture, made insect proof; 1 table case, department of botany, repaired; 1 Kensington case, remodeled; 1 case for domestic fowls, remodeled.

Screens, frames, unit boxes, drawers, diaphragms, bases, trays, etc., made in the Museum workshops during the year 1890–'91:

Two mahogany table screens; 11 pine screens; 79 mahogany label frames; 103 oak, ash, cherry, and pine label frames; 7 pine picture frames; 364 stands for specimens; 8 mahogany table tops; 1 walnut table top; 5 pine table tops; 1 pine, upright desk, for office work; 1,729 pine trays, for specimens, stored in cases; 358 drawers, cherry, poplar, and pine, for cases; 90 unit boxes, for exhibition cases; 48 costume boxes; 23 pine diaphragms, for cases; 78 walnut and pine bases, for specimens; 2,943 blocks, for the exhibition of minerals; 4 pine card catalogue boxes; 7 tank boxes, for receivers for specimens; 238 boxes for storing and shipping specimens; 433 shelves, for cases, etc.; 180 zinc partitions, for files cases; 184 pine partitions, for files cases; 433 shelves, for cases; 11 brackets, for exhibition purposes; 200 tin label holders; 1 case for negatives, photographer's department; 6 presses, for specimens, department of botany.

Screens, frames, drawers, trays, bases, etc., extended, refitted, reglazed, painted, and otherwise repaired, during the year 1890–'91:

One hundred and sixteen wing frames, glazed and fitted with hinges; 2 wall-screens extended; 67 ash screens repaired; 4 pine screens repaired; 1,193 pine trays fitted in cases; 35 pine trays altered; 110 unit boxes stained; 78 bases painted; 33 diaphragms for cases, painted; 52 costume boxes altered, stained, and glazed; 3,362 blocks painted; 101 windows reglazed.

HEATING AND LIGHTING.

The appropriation for heating and lighting, 1891, is $12,000. Following are the disbursements:

For salaries or compensation, $5,084.91; coal and wood, $2,766.96; gas, $1,233.84; electric supplies, $905.68; electric work, $7.50; telephones, $604.40; rental of call boxes, $100; heating supplies, $448.95; traveling expenses, $5.42, making a total of $11,157.66, and leaving on hand a balance of $842.34 to meet outstanding liabilities.

In addition to the items mentioned in the detailed list, much work of a general nature has been accomplished, and while the routine has not differed materially from that of former years, the total amount expended for services is somewhat less than that of last year.

Frequent repairs in the large flat roof of the Museum building have been necessary, and pending the anticipated laying of a granolithic pavement, the floors have been patched in many places; the trenches beneath the Museum have been thoroughly cleaned and whitewashed and the electric wires therein put in order, so far as possible; the north balcony has been painted and the walls calcimined, and in the rooms adjacent to the eastern entrance, and in the balcony and stairway above them, the walls have been calcimined and the woodwork painted.

The moving of the heavy exhibits, which occasionally becomes necessary in order to place suitably in the series the valuable objects which from time to time come into possession of the Museum, is an important feature in the duty of the force. The articles, many of them of great weight, must be handled with skill in order to prevent injury to themselves, to other objects, or to the building. The superintendent has placed rollers under the large cases, which serve to remove them from any dampness of the floor, and allow them to be moved with all

the facility possible under the circumstances, and in changing the position of the engine "John Bull," it was found necessary to construct a railway track for the purpose.

It is worthy of mention that the painters in the superintendent's force are frequently called on to trace, color, and letter the large charts and maps required by the different curators, or used in illustrating the scientific lectures given in the Museum hall.

By economy of administration, the Museum has been able to increase its insufficient electric-light plant, so that now it has a small dynamo, which supplies twenty-five arc lights, of 2,000 candle power each. This is only about one-half the number required for a satisfactory illumination, but by screening off the courts it was found possible to light the halls so that the building could be opened for the admission of the American Medical Association on the evening of May 7, and for the National Geographic Society on the evening of May 29, 1891.

With the limited means available, no elaborate form of installation of the electric-light plant could be adopted, and it was necessary to pass the wires loosely from burner to burner around the building. It is hoped that a future appropriation will make it possible to remedy the defects in the present system, and will permit the purchase of a dynamo of such power that the whole building can occasionally be thrown open at night, for the accommodation of those who can not avail themselves of the regular hours of admission, as well as for the various scientific associations of Washington and the country, as often earnestly requested.

The changes found necessary in the heating apparatus, such as adjusting radiators, making connections with steam pipes, etc., have this year, as last, been made by the regular force without outside help. Several improvements in the boiler room, among which may be mentioned inclosing the pipes in a wooden casing, removing partitions and fitting up the vault for dyamo used to run the system of electric lights in the building, have been completed in the same way.

As stated in the report of last year, the boilers, especially those of the Smithsonian building, have been for some time in an extremely unsatisfactory condition. Proposals have accordingly been invited for the purchase and setting in place of new ones, and an appropriation of $3,000, which becomes available at the close of the present fiscal year, has been made by Congress for this purpose.

Mention was also made in my last report of the necessity for removing the decayed wooden floors in the Museum and substituting therefor granolithic or artificial stone pavement. Five thousand dollars having been appropriated for this object, proposals for the necessary pavement have been invited.

The appointment by the secretary of the Smithsonian Institution, of Mr. J. M. Parkhurst as engineer, dates from December 1, 1890. In

deciding this appointment, the Museum was much indebted to the courtesy of Commodore Melville, U. S. Navy, who, in compliance with the request of the Secretary, appointed Passed Assistant Engineer Baird, and Assistant Engineer Norton, of the Navy, as a board to examine the candidates.

There were twenty-five applicants for the position, eight of whom completed the examination. The questions, fifty-five in number, were mostly on practical engineering and practical electric lighting. The papers of Mr. Parkhurst reached a percentage of 83.81; those of two other candidates, Mr. F. M. Stromberger and Mr. R. H. Speake were but slightly less. The examining board pronounced the percentage reached by several of the competitors remarkable, considering the character of the questions submitted.

The complicated nature of the duties connected with this position, both in the Smithsonian Institution and the Museum, renders apparent the necessity of having the appointment depend upon a competitive examination, which is a thorough test of ability.

In the autumn of 1890 permission was given by Mr. Clark, the architect of the Capitol, to remove from the crypt beneath the building the original plaster model of the bronze statue by Crawford, which surmounts the dome, and to deposit the same in the Museum.

The work of removing the fragments of this cast was begun in October, 1890. A brick and cement base was prepared in the center of the rotunda and the erection and restoration of the statue were begun on the 8th of December. The model, which had remained for nearly thirty years in the basement of the capitol, was found to be so broken, many of the more delicate parts being entirely gone, that its complete restoration from the fragments seemed impossible. In addition to difficulties of this sort, in order to move and place safely in position the immense pieces of the statue which remained intact, it was found necessary to saw them carefully into smaller parts, which after being lifted into place were securely reunited. Great interest was manifested in the restoration, it being observed that many persons came regularly to watch its progress, and it was a matter for congratulation when the difficult work was finally satisfactorily completed. The restoring was done by an employé of the Museum, Mr. Theodore Mills, son of Clark Mills, who in 1860 cast from this model, the statue in bronze for the Capitol.

The preparation for the World's Columbian Exposition has been begun under the direction of Dr. Goode, representative of the Smithsonian Institution and National Museum. As the most skillful workmanship is required in this connection, many of the best employés of the museum have been transferred to the Exposition roll, and a few others of known efficiency have been appointed.

Mr. R. E. Earll, who took part in the Fisheries Exhibition in London,

in 1882, in the World's Cotton Exposition at New Orleans, in 1884, and who was superintendent of the Museum display during the Centennial Exposition of the Ohio Valley at Cincinnati, in 1888, has been made chief special agent of the Smithsonian for the World's Columbian Exposition, and will devote his entire energy to the preparation and installation of the Museum exhibit.

The wording of the bill making the appropriation for the Columbian Exposition renders the employment of clerical help upon the Exposition roll virtually impossible, so that the necessary work of this class must be done by the employés of the Museum. The preparation and settlement of accounts, in this as in other recent expositions, will devolve upon the clerks of this office, in addition to their other duties.

Many requests have been received this year, as in the past, from museums, scientific associations, universities, colleges, etc., in this and other countries, for information in regard to the Museum standard cases, of various types, in compliance with which cyanotypes of the cases, with details as to cost of construction, have frequently been sent out. Among the institutions asking for information of this sort during the year may be mentioned the American Museum of Natural History and the Academy of the Sacred Heart, New York City; the College of Fine Arts, Syracuse, N. Y.,; the College Museum, Bloomington, Ind.; the State University, Iowa; the Academy of Natural Sciences, San Francisco; the University of Toronto, and the Royal Society of Northern Antiquaries, Copenhagen.

In this connection I would note the fact that several new designs for cases, which prove highly satisfactory, have been made by the engineer of property, and in some instances, by uniting the most desirable features of different cases, others of a new pattern have been constructed under the direction of Mr. Watkins, which prove admirably suited to the purposes required.

The work of the Museum, which has been gradually but surely extending itself in various directions without a commensurate increase of the force, has been accomplished only by the means of the most faithful and energetic service on part of the employés, many of whom have been frequently required to work beyond the regular hours. It should be added that a request for such extra service has always been most cheerfully complied with.

CORRESPONDENCE AND REPORTS.

The system adopted several years ago for conducting the correspondence still prevails and has been found on the whole satisfactory. This division of the Museum is under the charge of Mr. R. I. Geare, assisted by a corps of stenographers and typewriters. The number of correspondents of the Museum is constantly increasing.

The following geographical statement of letters written in this office

includes only those containing technical information on various subjects:

Locality.	Number of letters written.	Locality.	Number of letters written.
Alabama	29	Texas	81
Alaska	4	Utah	26
Arizona	41	Vermont	11
California	147	Virginia	111
Colorado	36	Washington	4
Connecticut	69	West Virginia	38
Delaware	1	Wisconsin	43
District of Columbia	1,463	Wyoming	11
Florida	69	Foreign countries:	
Georgia	27	Africa	7
Idaho	13	Asia	1
Illinois	130	Australia	15
Indiana	62	Austria	2
Indian Territory	7	Belgium	2
Iowa	84	Canada	53
Kansas	27	Central America	12
Kentucky	32	China	28
Louisiana	18	East Africa	1
Maine	32	England	103
Maryland	94	Egypt	2
Massachusetts	187	France	37
Michigan	83	Germany	33
Minnesota	55	Greece	2
Mississippi	13	Hungary	3
Missouri	48	Italy	8
Montana	31	India	4
Nebraska	33	Ireland	3
Nevada	3	Japan	4
New Hampshire	16	Mexico	23
New Jersey	118	Norway	2
New Mexico	70	Prussia	5
New York	497	Russia	9
North Carolina	37	Scotland	7
North Dakota	4	South America	8
Ohio	148	South Africa	14
Oklahoma Territory	3	Spain	7
Oregon	19	Straits Settlements	2
Pennsylvania	287	Sweden	7
Rhode Island	10	Switzerland	2
South Carolina	44	Turkey	7
South Dakota	27	West Africa	2
Tennessee	113	West Indies	2

In addition, about 3,000 letters pertaining to general Museum correspondence have been prepared in this office. In all, about 8,000 official papers have been prepared during the year for the signature of the Secretary and the Assistant Secretary.

This division has been charged with the acknowledgments of all

gifts to the Museum, and with the preparation of reports upon material sent to the Museum for examination. The preparation and editing of the annual reports of the Museum, as well as the proof-reading of the same, also form a part of the work of this office.

PREPARATION OF LABELS.

During the year 4,126 forms of labels were printed, as shown in the following tables, 24 copies of each form being printed:

Department.	No. of forms.	Department.	No. of forms.
Geology	2,086	Ethnology	150
Materia Medica	1,062	Graphic Arts	130
Transportation and Engineering	326	Prehistoric Anthropology	103
Oriental Antiquities	241	Total	4,126

BUILDINGS AND LABOR.

POLICE AND PUBLIC COMFORT.

Mr. Henry Horan, superintendent of buildings, remains in charge of this department, the employés of which consist of watchmen, painters, carpenters, laborers, cleaners, and attendants. Mr. C. A. Stenart is assistant superintendent. The force of carpenters number eight or nine, who are kept continually busy constructing cases and shelves, remodeling old cases, making repairs to buildings, etc. Only two painters are kept constantly on the Museum roll, and their time is completely occupied in keeping the buildings and fixtures in proper condition.

From the report of the superintendent the following statements are quoted, in order to convey an idea as to the character of the work accomplished in this department:

1890.

July.—A dynamo engine was placed in the engine room. A connection of water and gas pipe was made for the accommodation of the mammal department. Laborers were engaged in remodeling the south entrance preparatory to making changes in cases, shelving, and other appointments.

August.—A new gas engine to run the dynamo was placed in the engine room. The lecture hall and the east balcony were cleared for the meeting and exhibit of the Photographers' Association. The marble statue of Daguerre was placed in the rotunda and unveiled August 15. The collection of oriental antiquities was transferred from the west hall to the southeast corner of the north hall. The lecture hall was put in order for the meeting of the Association of Official Agricultural Chemists, August 28.

September.—Numerous miscellaneous items of work were completed by the mechanics. Mahogany table tops were placed in the exhibition hall of the Smithsonian building. Steam pipes were altered and an extra pipe was placed outside of the Natural History laboratory building for the department of mammals.

October.—Four large pine screens were placed in the east hall. The stairway of the northwest pavilion was painted and the wall wainscoted. The original cast of the Statue of Liberty was placed in the rotunda of the building.

November.—A pedestal was placed in the rotunda of the building for the plaster statue of Liberty. The lecture hall was prepared for the meetings of the American Ornithologists Union, November 18.

December.—J. H. Parkhurst was appointed engineer in charge of heating apparatus, December 1. The lecture hall was prepared for the meeting of the American Histori-

cal Association December 31. The railing formerly around the boat hall was removed and placed in the lecture hall. Owing to the cold weather two laborers were detailed for special duty in the engine room. Plumbers were busy repairing leaks in sewer pipes. A large radiator in the superintendent's office was removed and a new one substituted.

1891.

January.—The wires running from the boiler room to the various electric lights in the building were inspected and repaired. The National Dairy and Food Commissioners' Association met in the lecture hall December 14. The building was wired for electric lights.

February.—The transportation exhibit in the eastern hall was rearranged, necessitating the services of the greater part of the laboring force. Changes were made in the boiler room, whereby considerable more room and space were gained. Two large pine screens were made and placed at the entrance to the rotunda balcony in the south hall.

March.—The rooms on the south side of the east entrance were newly painted. The office rooms on the west balcony were frescoed and painted. The large painting, "The March of Time," by Henry Sandham, deposited by the artist, was placed in the north hall. The basement of the Smithsonian building was thoroughly cleaned and whitewashed.

April.—A large force of laborers was engaged in preparing an exhibit of patents in the lecture hall, in connection with the Patent Centennial celebration. Laborers were engaged for several days in arranging lecture hall and office rooms for the meetings of the National Academy of Science. The roof on the building at the west end of the Smithsonian was removed.

May.—The electric lights were placed in order for the visit of the Medical Congress on May 7. The cases and material in the anthropological hall of the Smithsonian were entirely rearranged necessitating the detail of a large laboring force. A leak in the gas main at the south entrance was repaired by the Museum plumbers and laborers. A large shed was prepared for the taxidermists' work.

June.—Twenty ½-unit cases were removed from the west balcony to other departments of the Museum, being replaced by two large wall storage cases. A force of laborers was engaged for several days in preparing the shed south of the Smithsonian building for the taxidermists in connection with the World's Fair. The work of removing the old roof from the chapel in the Smithsonian building is under way, requiring a large force of laborers.

THE WORK OF THE MUSEUM PREPARATORS.

TAXIDERMISTS.

In September, 1890, the force of taxidermists was reorganized. At that time it consisted of only three regular taxidermists and one volunteer, and the number was not increased until the spring, when one taxidermist was designated to take general charge of the work under superintendence of the curator of mammals. The skins which had accumulated in the vats, some 400 in number, were examined and their exact condition (for mounting or addition to the reserve series) was ascertained. A card-catalogue of the entire collection of skins was prepared, detailed information regarding each skin being obtained. In March, 1891, preparations were commenced for an exhibit of mammals at the World's Columbian Exposition. A plan was submitted and approved, steps being immediately taken to obtain the necessary material for exhibition. The force of taxidermists was then increased and a special workshop was fitted up for their use, Mr. William Palmer being appointed chief taxidermist. The number of regular taxidermists was increased to six, and one special laborer was also added.

Collection of mounted domestic animals.—The work of mounting typical specimens of domestic birds has been continued by Mr. Nelson R.

Wood, who completed sixty-nine specimens during the year. The mounting of most of these skins was a difficult task. A number of alcoholic specimens were also mounted. The material development of the collection of thoroughbred domestic fowls and pigeons, which was increased by the addition of forty-four specimens, is largely due to the energy and zeal of Mr. Wood, who has endeavored to show prominently the distinguishing characteristics of the various breeds.

OSTEOLOGICAL PREPARATOR.

Mr. F. A. Lucas, osteologist, states that the preparation of osteological specimens for the exhibition and study series has made favorable progress. The amount of work accomplished is indicated in the following statement:

	Mammals.	Birds.	Reptiles.	Fishes.	Total.
Received in the flesh:					
Entire skeletons	31	51	1	1	84
Skulls	1				1
Cleaned:					
Entire skeletons	16	65	3	6	90
Incomplete skeletons	5		1	2	8
Skulls	428	1	2	3	434
Mounted:					
Entire skeletons	3	16	4	2	25
Limbs and other pieces	2	3			5
Skulls			3		3
Total	486	136	14	14	650

In addition, a number of specimens of vertebrate fossils were cleaned, repaired, and mounted, molds and casts of combs made for domestic birds, 13 rare and valuable eggs repaired, and 150 specimens arranged for the synoptic series of invertebrates. The specimens of domesticated animals and the small series contained in the taxidermic collection have been completely rearranged and installed in new cases. As in previous years, Mr. Scollick has assisted in the preparation of vertebrate fossils and other osteological material.

PHOTOGRAPHER.

Mr. T. W. Smillie, photographer, reports that he has made 511 negatives during the year, as follows:

Mammals	222
Ethnology	85
Marine invertebrates	14
Prehistoric anthropology	11
Graphic arts	3
For the Smithsonian Institution	51
For the National Zoölogical Park	45
Miscellaneous	80

Two thousand and twenty-four silver prints, made during the year, were distributed as follows:

Mammals	430
Ethnology	191
Prehistoric anthropology	30
Marine invertebrates	29
Graphic arts	44
For the Smithsonian Institution	153
For the National Zoölogical Park	95
For the Department of State	450
Miscellaneous	602

In addition to these, 199 cyanotypes were made, of which 147 were for the Museum and 52 for the Zoölogical Park; 92 transparencies were prepared for the purpose of illustrating public scientific lectures, and 5 photographs enlarged. Numerous photographic outfits were supplied for scientific expeditions and for the World's Fair Commissioners; several students instructed in the methods of photography, and a good deal of experimental work done.

As in past years, the photogrpahic work of the Fish Commission was performed under the supervision of Mr. Smillie. This included 1,131 cyanotype prints, 15 silver prints, and 15 negatives.

DRAFTSMEN.

Mr. W. H. Chandlee and Mr. W. H. Burger have continued the preparation of illustrations for Museum publications. Drawings have been made of objects belonging to the Abbott and Chatelain African collections; of tablets for Paymaster Thomson's paper on Easter Island; of arrows, powder-horns, lamps, matches, etc., for papers by Prof. Otis T. Mason and Mr. Walter Hough; and also of specimens of marine invertebrates, osteological specimens, and instruments used in taxidermic work. In addition to this a large amount of miscellaneous work has been accomplished, including the sketching and tracing of charts, maps, and diagrams of the arrangement of exhibits, lettering and engraving of labels, etc.

COLORIST.

Mr. A. Zeno Shindler has been occupied during the year in painting in oil for the department of ethnology representations of the various races of men, and of a Japanese native; in coloring a number of photographs of Indians and negroes from the collections of Prince Roland Bonaparte; in representing in water colors the process of silk reeling, and the preparation of vegetable wax in Japan; in restaining and repairing a bust of King Kalakaua of the Sandwich Islands, and in painting life-sized casts of a Samoan, a Dyak, and a negro. He has also prepared a map showing the location of the Indian tribes in the United States, and a relief map of one of the St. Guan mining districts of California.

H.—ACCESSIONS.

Ten years ago the National Museum moved into its new building, and the present year marks the close of a very important decade in its history. The increase in the collections during this period has been unexpectedly large, the accessions from all sources now numbering 3,028,738 specimens. In 1882, when the first census of the collections was made, the total number of specimens was estimated at less than 200,000. The totally inadequate space provided for this vast accumulation of material has been so frequently commented upon in previous reports, that it is not necessary to reiterate the recommendations to Congress for another building.

The total number of accessions to the Museum during the year is 1,187 (Nos. 23,341–24,527), inclusive).

A geographical review of the more important accessions during the year is here presented. This is preceded by a brief classified statement showing the most valuable contributions of the year.

STATEMENT OF THE MOST IMPORTANT CONTRIBUTIONS OF THE YEAR.

(Arranged by Departments in the Museum.)

ANTHROPOLOGY.

Archæology.—A large collection of prehistoric copper and galena objects, chiefly from Wisconsin and Ohio, purchased by special appropriation of Congress from Frederick S. Perkins, of Madison, Wis.; anthropological objects from the site of the ancient aboriginal fish-weir near Claymont, Del., presented by Dr. Hilborn T. Cresson, Philadelphia, Pa.; sandstone rock containing human bones, found in Florida and transmitted by Judge John G. Webb, Osprey, Fla.; archæological specimens from the base of Roan Mountain, North Carolina, collected by Mr. P. L. Jouy, of the National Museum.

Ethnology.—A collection of ethnological objects from the native tribes of Angola, Africa, including medicine horns and musical instruments, presented by Mr. Héli Chatelain, of Vineland, N. J.; a fine collection of spears, shields, bows, swords, birds' skins, and personal ornaments from the Kilima-Njaro region, East Africa, collected and presented by Dr. W. L. Abbott, of Philadelphia, Pa.

ZOÖLOGY.

Mammals.—Two pairs of interlocked elk antlers from Montana, deposited by Hon. Clinton L. Merriam, Locust Grove, N. Y.; four skins of Belding's Spermophile, from Mr. L. Belding, Stockton, Cal.

Birds' skins.—A valuable collection comprising 427 specimens of birds' skins from the island of Yesso, Japan, and containing species new to the collection, purchased from Harry V. Hensen, Hakodadi, Japan;

194 specimens of birds from the interior of Honduras, purchased from Mr. Erich Wittkugel, of San Pedro Sula, Republic of Honduras; a collection of birds from South Carolina, containing one species (*Cistothorus marianæ* Scott) new to the Museum collection, received from Mr. James E. Benedict, of the National Museum.

Birds' eggs.—An exceedingly valuable collection of nests and eggs received from R. MacFarlane, esq., of the Hudson Bay Company; 15 specimens of birds' eggs, 15 specimens of eggs of the rare Franklin's grouse (*Dendragapus franklinii*), 4 eggs of the Greater Yellowlegs (*Totanus melanoleucus*), 9 eggs of the Canadian Ruffed grouse (*Bonasa umbellus togata*), were presented by Mr. W. E. Traill, of Fort St. James, British Columbia; 8 nests and 13 eggs, all collected in the District of Columbia, were received from Dr. Hugh M. Smith, of the U. S. Fish Commission.

Fishes.—A collection of fishes, made by the U. S. Fish Commission steamer *Albatross*, from the Galapagos Islands and Panama, received from the U. S. Fish Commission; a collection of deep-sea fishes from the Atlantic Ocean and the Mediterrean Sea, received through Mr. Léon Vaillant, from the Museum of Natural History, Paris, France; fishes collected in the Bay of Guaymas, Sonora, Mexico, received from Prof. B. W. Evermann, Greencastle, Ind.

Reptiles and batrachians.—A very interesting collection of reptiles from Mr. Charles K. Worthen, Warsaw, Ill.; alcoholic specimens of lizards from Arizona, collected by P. L. Jouy, of the National Museum; a collection of reptiles from Idaho, made by Dr. C. Hart Merrian, of the Department of Agriculture; several collections of reptiles, made by Charles R. Orcutt, of San Diego, in southern California; reptiles from the Seychelles Islands and the Kilima-Njaro mountains, collected by Dr. W. L. Abbott, of Philadelphia, Pa.

Mollusks.—An interesting collection of marine shells from the coast of Venezuela, including a beautiful series of the Argonaut, received from Mr. R. M. Bartleman of the United States legation at Caracas, Venezuela; a remarkably fine series of *Tritonum femorale* from the Bahama Islands, presented by Mr. Isaiah Greegor of Jacksonville, Fla.; an interesting series of shells and miocene fossils, collected by Messrs. Henry W. Elliott and William Palmer in connection with their visit to the Seal Islands of Alaska; collections from the western Atlantic coast obtained by the naturalists of the Fish Commission.

Insects.—A collection of *Tineidæ* including North American and European species, transmitted to the National Museum by the Department of Agriculture; a collection of specimens of Lepidoptera and Coleoptera, collected in California and Washington by Mr. A. Koebele, and transmitted by the Department of Agriculture; an extensive series of North American Microlepidoptera from the Department of Agriculture.

Marine invertebrates.—A collection of Brachyurans from the U. S. Fish Commission; a collection containing 500 specimens of annelids

from Beaufort, N. C., and Willoughby Sand Spit, Virginia, received from Dr. E. A. Andrews of Baltimore, Md.; a collection of echinoderms received in exchange from the Royal Museum of Natural History, Berlin, Germany.

Invertebrate fossils (*Palæozoic*).—A valuable collection comprising 44 species of Cambrian fossils, received from the Geological Survey of Sweden, Stockholm; 232 specimens of Bala fossils, received from Mr. Thomas Ruddy of Cowen, Wales.

(*Mesozoic.*)—Forty-seven specimens of cretaceous fossils from Alabama, Mississippi, Texas, and Colorado, received from the United States Geological Survey; a collection of fossil insect masses, presented by Mr. S. H. Scudder, of Cambridge, Mass.

BOTANY.

Fossil plants.—A collection of carboniferous fossil plants, received from Dr. J. H. Britts, of Clinton, Mo.; fossil plants from Victoria, New South Wales, presented by Baron Ferd von Müeller, Royal Botanical Gardens, Australia; seven specimens of fossil plants from the Devonian and Carboniferous formation of Ohio, presented by Prof. Edward Orton, of Columbus, Ohio.

Recent plants.—A collection of dried plants from India, presented by the Royal Botanic Garden, Calcutta, India, through Dr. G. King, superintendent; a collection of Norwegian mosses, presented by Dr. I. Hagen, Trondhjem, Norway; specimens of Florida plants, presented by Mr. Otto Vesterlund, Storvreta, Sweden.

GEOLOGY.

Minerals.—A collection of Russian minerals, received from Mrs. Mary I. Stroud, of Washington, D. C.; a superb series of mineral specimens, consisting mainly of silver, copper, and cerussite, from the Broken Hill mines in Australia, presented by Mr. Walter H. Koehler; the gem collection of the late Dr. Joseph Leidy, containing 400 cut stones, purchased from Dr. Leidy's estate.

Rocks and ores.—A large series of ores and economic minerals from Texas, Mexico, New Mexico, and California, collected by Mr. F. W. Crosby, of Washington, D. C., constituting the most important accession of the year; a fine lot of onyx marble from Prescott, Ariz., presented by Mr. William O. O'Neill; a large study series of ores and rocks, illustrating the quicksilver deposits of the Pacific slopes, received from the U. S. Geological Survey.

MISCELLANEOUS.

Through the courtesy of Mr. Edward Clark, Architect of the Capitol, the original full-size plaster cast of the statue of Liberty, modeled by Mr. Thomas Crawford, was received; a Sechuana bible used by Dr. David Livingston in his journey from the Cape of Good Hope to Lo-

anda, in 1852, presented by Mr. Héli Chatelain, of Vineland, N. J.; manuscripts, drawings, letters, etc,, comprising the "Vail papers" relative to the invention and early application of the telegraph, received from the American Historical Association; autograph manuscripts, glass pitcher, wine glasses, silver cake-basket, and other relics of Gen. Washington; a collection of 20 Chinese musical instruments, obtained by Dr. Julius Neumann; 240 colored plates, illustrating the forest flora of the United States, received from the Massachusetts Society for Promotion of Agriculture; model of the vessel *Half Moon*, received from William J. Boyd, of Brooklyn, N. Y.; a model of a Burmese canoe, received from Dr. John Bartlett, of Chicago, Ill.; the electro-magnetic engine for producing reciprocating motion by magnetic attraction and repulsion, invented and constructed by Prof. Joseph Henry in 1831 (this being one of the first applications of electricity for producing power), deposited by Miss Mary Henry; a collection of incandescent lamps, switches, and other apparatus used in 1881 in one of the earliest electric-light plants in America, transmitted by the Hinds-Ketcham Company of Brooklyn, N. Y.; a complete collection of the woods of the Argentine Republic, presented by the Museo de Productos Argentinos, Buenos Ayres.

GEOGRAPHICAL REVIEW OF THE MORE IMPORTANT ACCESSIONS RECEIVED DURING THE YEAR.

AFRICA.

EAST AFRICA.

Mount Kilima-Njaro and vicinity.—From Dr. W. L. Abbott, of Philadelphia, Pa., has been received a magnificent collection* of spears, shields, bows, swords, wooden dishes, and personal ornaments of the Wa Chaga and Wasai negroes; insects of all orders, a large collection of birds' skins representing many species, reptiles, and mammals; plants, birds' eggs, shells, and photographic negatives illustrating ethnological subjects.

Zanzibar.—From Messrs. Crockett and Harrison, of Bridgeport, Conn., were received two pieces of gum.

NORTH AFRICA.

Algiers.—From Mr. W. W. Rockhill, of Washington, D. C., was received a pair of Algerian spurs.

Tunis.—From Mrs. Emma S. Brinton, of Washington, D. C., was received in exchange, a pottery lamp of green glaze.

Mr. Edward Lovett, of Croydon, England, sent in exchange four

*A catalogue of this collection is published in this volume.

Hoschish pipes from Tunis, and a Moorish lamp from the northern part of Africa.

Judge Jacob J. Noah, of Washington, D. C., transmitted two plates, one made of porcelain and brought from Tunis in 1818.

SOUTH AFRICA.

Cape Town.—Mr. J. H. Brady, Education Bureau, Cape Town, sent a collection of insects.

Mr. W. E. Frye, of Cape Town, transmitted a series of antelope horns.

Griqualand.—Mr. Seal, of Cape Town, through the courtesy of Prof. Cleveland Abbe, of Washington, D. C., sent a beautiful specimen of crocidolite.

Kafirland.—From the British Museum, London, England (through the agency of Mr. Charles H. Read), were obtained, in exchange, twenty-three ethnological objects.

Through Prof. E. J. Loomis, of the United States Eclipse Expedition, were received specimens of rocks from the Kimberley diamond mines.

WEST AFRICA.

Angola.—Mr. Héli Chatelain, of Vineland, N. J., has enriched the Museum collections by several contributions, and other objects of interest have been obtained from him by purchase. Among the specimens received are a collection of rocks, shells, fossil plants, mammals, reptiles, insects, crabs, starfishes, birds' nests, plants, ethnological objects of all kinds, and a collection of Portuguese-African coins.

Rev. William P. Dodson, in charge of the Bishop Taylor Mission, Loanda, transmitted (through Prof. Cleveland Abbe) a Kimbunda hatchet, called "Dikellemba," made by a native smith of the Lunda country, and a basket called "Kinda," made by a native woman of Angola.

Mr. Walter Hough, of the U. S. National Museum, presented a specimen of *Bostrychus cornutus*, representing the imago, larva, and specimen of work.

AFRICA (MISCELLANEOUS).

Mr. Héli Chatelain, of Vineland, N. J., presented hair from the head of a McBamba negro, and a Sechuana bible (Pentateuch) used by Dr. David Livingstone on his journey from Cape of Good Hope to Loanda in 1852, containing the autograph of Dr. Livingstone. Mr. Chatelain also transmitted the skin of a crocodile, obtained from him by purchase.

Mr. W. E. Frye, of Cape Town, sent a specimen of asbestus from the Orange River, Mount Hopetown; a specimen of Iceland spar from Van-

Rhyn-Dorf, a Bushman's stone picked up near Cape St. Francis Lighthouse, skull of Cape leopard (tiger), and a small gourd used as a whistle for signaling.

Rev. H. S. Gorham, of Dartford, Kent, England, sent in exchange 33 specimens representing 19 species of named African coleoptera.

The H. W. Johns Manufacturing Company, of New York City, transmitted a specimen of asbestus.

From Messrs. Lewishon Brothers, of New York City (through the courtesy of Messrs. Phelps, Dodge & Co.), was received a sample of tin from the interior of Africa.

Mr. Edward S. Schmid, of Washington, D. C., presented a Parrot (*Psittacus erithracus*).

AMERICA.

NORTH AND CENTRAL AMERICA.

From the Agricultural College, Lansing, Mich., through Prof. A. J. Cooke, were received in exchange 40 species of North American coleoptera, 17 of which are new to the collection.

Through Col. Marshall McDonald, U. S. Commissioner of Fisheries, were received from the Fish Commission a collection of 1,128 specimens, representing 33 species of brachyurans and anomouran crustaceans collected by the steamer *Albatross*, and 327 specimens of duplicate echini, also obtained from the collections of the *Albatross*.

From Mr. Charles Palm, of New York City, were received in exchange 90 specimens, representing 41 species of North American coleoptera, either new to the collection or represented by a single specimen.

From the Department of Agriculture, through Prof. C. V. Riley, were received 382 species of lepidoptera; 110 specimens of North American coleoptera representing 54 species, new to the collection, and collected by Mr. H. F. Wickham, of Iowa City, Iowa; a collection of *Tineidæ*, containing 900 specimens, and representing about 430 North American species; 1,100 specimens of North American microlepidoptera representing 240 species; 25 species of coleoptera, mostly new to the collection, obtained from a number of specimens sent by Prof. Cooke, of the Agricultural College, Lansing, Mich., for identification.

A large study series of rocks and ores, illustrating the quicksilver deposits of the Pacific slope, was received from the U. S. Geological Survey.

From Prof. J. B. Smith, of New Brunswick, N. J., were received 15 specimens of North American *Noctuidæ* representing 12 species, types of 10 species represented by 12 specimens.

From Mr. Henry Ulke, of the District of Columbia, were received 37 specimens, representing 19 species of rare North American coleoptera.

BRITISH AMERICA.

Canada—British Columbia.—From Mr. W. E. Traill, Fort St. James, Stuart's Lake, were received skins and eggs of Franklin's Grouse (*Dendrogapus franklinii*), and Canadian Ruffed Grouse (*Bonasa umbellus togata*); also eggs of the Greater Yellow-legs (*Totanus melanoleucus*), all of which are rare specimens.

Lake St. John, Quebec.—From Mr. George R. Dana, of Washington, D. C., was received a Landlocked Salmon (*Salmo salar sebago*).

Ontario.—From Mr. R. P. Travers, of Illinois, were received specimens of nickel and copper from the Sudbury district, and nickel ore from the Chicago Nickel Company, Inez Mine, Travers, Algona district.

Vancouver Island.—From Mr. I. C. Russell, of the U. S. Geological Survey, were received 3 specimens of coal.

An exceedingly valuable collection of birds' nests and eggs was received from Mr. R. MacFarlane of the Hudson Bay Company.

CENTRAL AMERICA.

Costa Rica.—From the Museo Nacional de Costa, Rica San José, through Señor Anastasio Alfaro, was received a skin of *Antrostomus rufomaculatus*, representing a new species.

From Mr. George K. Cherrie, of the Museo Nacional de Costa Rica, San José, were received 73 specimens, representing 22 species of birds' skins from Costa Rica, forming a valuable addition to the collection; and, through the courtesy of Mr. Cherrie, from the museum at Costa Rica, were received in exchange 63 birds' skins representing 33 species, including types of 2 new species, 1 new genus, 2 species new to the collection, and plumages previously unrepresented. From Mr. Cherrie was also received an egg of *Vireo flavoviridis* from San José, new to the collection.

Guatemala.—From Lieut. Charles F. Pond, U. S. Navy, were received specimens of Grasshoppers (*Dictyophorus* sp.) and Fire-fly (*Photuris* sp.).

Honduras.—From Mr. Erich Wittkugel, of San Pedro Sula, were obtained by purchase 194 specimens of birds.

MEXICO.

Hidalgo.—Capt. John G. Bourke, U. S. Army, Fort Ringgold, Texas, deposited a sling used by the Hidalgo Indians.

Monterey.—From the Department of Agriculture, through Dr. C. Hart Merriam, were received 5 specimens of land shells collected by Mr. William Lloyd, of Monterey.

Queretaro.—From Mr. Miguel Piedra, of Lagos, Mexico, were received 4 opals.

Sonora.—Prof. B. W. Evermann, of Greencastle, Ind., transmitted a collection of fishes from the Bay of Guaymas.

Vera Cruz.—Prof. A. Dugès, of Guanajuato, transmitted a skin of Ferruginous Pygmy Owl (*Glaucidium phalœnoides*).

Miscellaneous.—Mr. William Brewster, of Cambridge, Mass., presented 3 specimens of the Lower California Wood Pewee (*Contopus richardsonii peninsulæ* Brewst.). Prof. A. Dugès presented specimens of *Rhodinocichla schiastacea* from southern Mexico.

From Prof. C. V. Riley, Department of Agriculture, were received a series of 400 species of coleoptera and 130 species of hemiptera, collected by Prof. L. Bruner, of Lincoln, Nebraska.

Mr. E. Kirby Smith, jr., of Vera Cruz, transmitted a Lantern-fly (*Fulgora lanternaria*) found halfway across the Isthmus of Tehuantepec, in a dense thicket.

UNITED STATES.

Alabama.—From the U. S. Geological Survey, through Maj. J. W. Powell, director, were received specimens of cretaceous fossils.

Alaska.—Capt. W. C. Coulson, U. S. Revenue Marine Cutter *Rush*, presented the skin of an adult male Walrus (*Odobœnus obesus*) from Walrus Island.

From Mr. I. C. Russell of the U. S. Geological Survey, were received 2 faulted pebbles from Pinnacle Pass, Mount St. Elias, 3 specimens of coal and a leather pouch containing a stone fish (used as a charm by medicine man), two stone mortars, adze, and stone implement.

Arizona.—From Capt. John G. Bourke, U. S. Army, were received ethnological objects and stone implements comprising grooved axes, hammers, rubbing-stones and other objects.

Mr. P. L. Jouy of the Museum staff collected 89 alcoholic specimens of lizards in different sections of Arizona.

From the U. S. Geological Survey, through Maj. J. W. Powell, director, was received a specimen of agatized wood, from Chalcedony Park, collected by Mr. F. H. Knowlton of the Survey.

From the Geological Survey, were also received 40 specimens of kyanite in quartz, 80 specimens of dumortierite in quartz; 74 specimens of dumortierite in quartz from Clip, Yuma County, and 45 specimens of brochantite and malachite from the United Verde Mine, Jerome, collected by Dr. W. F. Hillebrand.

Through the courtesy of the Quartermaster's Department, U. S. Army, were received a number of fine specimens of onyx marble from a quarry near Prescott, collected by Mr. William O'Neill.

Arkansas.—From Mr. Charles F. Brown, of Hot Springs, was received a specimen of wavellite from Mount Ida.

California.—From the Department of Agriculture, through Prof. C. V. Riley, were received 54 specimens of coleoptera, collected by Mr. D. W. Coquillet, of Los Angeles, Cal., some of which are new to the collection, and also a collection of specimens of lepidoptera, collected by Mr. A. Koebele.

Hon. Delos Arnold, of Pasadena, presented specimens of pliocene and post-pliocene fossils.

Dr. George F. Becker, of the U. S. Geological Survey, transmitted 2 specimens of iridosmine.

From Mr. L. Belding, of Stockton, were received 4 skins of Belding's Spermophile.

Mr. F. W. Crosby, of Washington, D. C., transmitted a large series of ores and economic minerals.

Mrs. C. H. Dall presented samples of auriferous black sand from the coast of Mendocino County.

From Mr. Henry Hemphill, of San Diego, were received marine shells and 3 specimens of *Ostria Veatchii* Gab.

Mr. L. L. Frost, of Susanville, presented a stone mortar found on a neighboring ranch near Honey Lake, and a perforated stone found near the banks of the Susan River, also 3 arrow-heads and 2 round stones.

From Mr. C. R. Orcutt, of San Diego, was received a collection of alcoholic specimens of reptiles, mammals, and a Black-headed Gull, alcoholic specimens of insects (mostly coleoptera), among which were 80 specimens of *Asida hirsuta*, collected in the Colorado Desert.

Prof. C. V. Riley, of the Department of Agriculture, transmitted to the Museum a series of lepidoptera, consisting of 17 specimens representing 17 species, and 200 specimens representing 20 species of coleoptera, most of which are rare and valuable to the collection. These specimens were obtained in the Colorado Desert by Mr. D. W. Coquillet.

Mrs. John A. Sherman, of Watertown, N. Y., presented a very beautifully prepared and abundant collection of sea-mosses and ferns, found by her on the Pacific coast, at Santa Barbara.

Dr. R. W. Shufeldt, U. S. Army, sent 3 alcoholic specimens of *Lagomys princeps* from the Sierra Nevadas.

Colorado.—From the U. S. Geological Survey, through Major J. W. Powell, director, were received specimens of cretaceous fossils; 10 specimens of cerussite from Polonia Mine, Rosita, collected by Mr. Whitman Cross; 2 specimens of gadolinite from Devil's Head Mountain, Douglas County, collected by Mr. L. G. Eakins, 1 specimen being the original material used by Mr. Eakins in identifying and describing the mineral from this locality, and 13 specimens of minerals from various localities in Colorado, which have been studied by Dr. Hillebrand, who collected the specimens.

Connecticut.—From Mr. C. H. Peck, of Newtown, were received 2 old brass buttons, and castings of 16 buttons of the kind in use in Revolutionary times.

Mr. John N. Sage, of Portland presented a fine specimen of fossil plant, *Dendrophycus triassicus* Newby.

From the U. S. Geological Survey, through Major J. W. Powell, director, were deposited 3 specimens of minerals from Glastonbury, collected by Dr. W. F. Hillebrand.

Delaware.—Dr. Hilborn T. Cresson, Philadelphia, Pa., deposited a collection of archæological specimens collected by Mr. William Reilly and Mr. F. G. Smith at the site of the "Ancient Aboriginal Fish Weirs."

District of Columbia.—Hon. Edward Clark, the Architect of the Capitol, transmitted the original full size plaster model of the Statue of Liberty, by Thomas Crawford. This was used in making the mold in which was cast the bronze statue now surmounting the dome of the Capitol.

From Dr. Elliott Coues of Washington, D. C., was received a specimen of Tinamou (*Eudromias elegans*) for skeletons.

Gen. Benjamin F. Hawkes, Washington, D. C., presented an Eskimo snuff-bag made from the foot of an albatross.

Dr. Hugh M. Smith, of the U. S. Fish Commission, presented 8 birds' nests and 13 eggs.

Mrs. Mary I. Stroud, of Washington, D. C., deposited 14 daguerreotypes made with a camera imported from France by Prof. Walter R. Johnson, of Washington, D. C., soon after daguerreotyping was discovered.

The Treasury Department, Bureau of Printing and Engraving, through Hon. William M. Meredith, Chief of the Bureau, presented 264 unmounted India impressions of portraits, vignettes, and lathe work.

Florida.—From Mr. Henry Edwards, of New York City, were received alcoholic specimens of insects.

Mr. C. L. Hopkins, of Umatilla, presented a living Glass snake (*Ophisaurus ventralis*).

Lieut. J. F. Moser, U. S. Navy, commanding the Revenue Marine Steamer *A. D. Bache*, presented specimens of fishes comprising *Chilomycterus*, *Ostracion*, *Pristis*, *Centropomus*, *Muræna*, *Balistes*, *Platyglossus*, *Hemirhombus*, *Urolophus*, *Centropristis*, *Monacanthus*, and *Echeneis;* alcoholic specimens of snakes, shells, and marine invertebrates.

From Dr. William L. Ralph, of Utica, N. Y., were received through Capt. Charles E. Bendire, U. S. Army, honorary curator of birds' eggs in the National Museum, the remains of an old Indian necklace, a stone implement from a mound-builders' tomb, and a handsome spear point; the skin of a Southern Hairy Woodpecker (*Dryobates villosus audubboni*) from San Mateo, and a collection of birds' eggs, mostly from Florida, including 3 species not before represented in the Museum collection.

From Hon. J. C. Slocum, United States surveyor-general, Tallahassee, through Hon. John T. Noble, Secretary of the Interior, were received several old surveying instruments from the office of the surveyor-general at Tallahassee. Among them were included a transit, telescope tube, brass frame, wooden tripod and detached legs; solar compass, tripod and leveling head for the same; sextant (in case) and a standard chain.

From the U. S. Fish Commission, through Col. Marshall McDonald,

Commissioner, was received a small collection of brachyuran crustaceans obtained off the coast of Florida by the Fish Commission schooner *Grampus*.

Mr. Lester F. Ward, of the U. S. Geological Survey, presented 2 fine specimens of *Zamia integrifolia*.

Judge Webb, of Osprey, transmitted a collection of human fossil remains, found in sandstone near the shore of Sarasota Bay.

Idaho.—From the Department of Agriculture, through Dr. C. Hart Merriam, chief of the division of mammalogy, were deposited 31 specimens of reptiles and batrachians, and Dr. Merriam presented 3 species of fresh-water gastropods from Salmon River, and one species of land shell from Needle Peak.

Dr. W. P. Jenney, of the U. S. Geological Survey, transmitted a specimen of native lead, with minium and anglesite, from Mineral Hill district, near Hailey, Alturas County.

Illinois.—A very interesting collection of reptiles was received from Mr. Charles K. Worthen, of Warsaw.

Indiana.—Three species of corals, consisting of *Monticulipora filiosa* (2 specimens), *Streptelasma cornoculum* (2 specimens), and *Protarea retusta*; three species of brachiopods, consisting of *Rhynchonella capax* (3 specimens), *Orthis biforata*, *Orthis retrorsa*, were received from Mr. F. Linsley, of Farmdale, Ohio. These specimens were found in the rocks of the Cincinnati Group (Hudson), Lower Silurian Age. Specimens of iron pyrites were also transmitted by Mr. Linsley.

From the U. S. Geological Survey, through Maj. Powell, director, was received a specimen of gyroceras (?) collected by Mr. C. D. Walcott, of the Survey.

From Mr. J. L. Cheyney, of Fort Dodge, Iowa (through Hon. C. C. Carpenter, M. C., and Hon. J. P. Dolliver, M. C., was received a silver watch which was carried by Thomas Cheyney, of Pennsylvania, during the Revolutionary war.

Hon. J. P. Dolliver, M. C., presented a fragment of the Winnebago County meteorite.

Mr. G. F. Kunz, of New York City, transmitted a specimen of meteorite from Winnebago County.

Seven specimens of corals representing 5 species from the Hamilton Group (Devonian) were presented by Mr. F. H. Luthe, of McGregor.

Kansas.—Mr. W. P. Jenney, of the U. S. Geological Survey, transmitted a specimen of native white sulphide of zinc from Moll Mine, Galena.

From Mr. George F. Kunz, of New York City, was received a specimen of meteorite from Kiowa County.

Kentucky.—Mr. George F. Kunz, of New York City, presented a specimen of meteorite from Carroll County.

Maine.—From the Cameron Silica Company, through Mr. C. E. Mitchell, superintendent, were received specimens of silica.

Maryland.—Mr. O. N. Bryan, of Marshall Hall, presented a collection of hammer stones, grooved axes, polished hatchet, paleolithic implements, rude notched implements, arrow and spear-points, pierced tablet, stone slab, with mortar like cavities, fragment of potstone vessel, and fragment of pottery.

From Master Samuel H. Hopkins was received a very beautiful specimen of American Sparrow Hawk (*Falco sparverius*).

Mr. Robert Ridgway, curator of birds in the National Museum, presented 44 birds' skins, representing 29 species.

Massachusetts.—Prof. W. O. Crosby, of Massachusetts Institute of Technology, Boston, transmitted in exchange three specimens of nickeliferous pyrrhotite from Dracut.

From the Deerfoot Farm Company, through Mr. James Cheeseman, was received the original centrifugal separator, erected on the Deerfoot farm in 1879.

A collection consisting of 160 stone implements from Blackman's farm, Blackmans Point, at the mouth of Cut River, Marshfield, was received from Mr. George B. Frazar, of West Medford.

From the Granite Railway Company, Boston, through Mr. H. E. Sheldon, was received a piece of the old track of the Granite Railway.

The Massachusetts Society for the Promotion of Agriculture presented 240 colored plates illustrating the forest flora of the United States.

From Dr. C. A. Norton, of Washington, D. C., were received a warming-pan formerly belonging to the Franklin family, a photograph of a fire-place in the Franklin homestead, Nantucket, and a photograph of the Whittier fire-place, Haverhill.

A collection of fossils was presented by Mr. S. H. Scudder, of Cambridge, Mass.

Mr. W. W. Wheildon, Concord, presented a piece of the "Old North Bridge," over which the Massachusetts minute men and the British troops first opened fire upon each other.

Minnesota.—From Dr. Edgar A. Mearns, U. S. Army, was received a Western Evening Grosbeak (*Coccothraustes vespertinus montanus*), first plumage, and new to the collection.

Mississippi.—From the U. S. Geological Survey, through Maj. J. W. Powell, director, were received specimens of cretaceous fossils.

Missouri.—Dr. J. H. Britts, of Clinton, presented 150 specimens representing about 35 species of carboniferous fossil plants from the vicinity of Clinton.

Montana.—From Mr. J. B. Koch, of Bozeman, were received 70 rude implements, consisting of knives, arrow-points, flakes, and a fragment of potstone vessel.

Dr. Clinton L. Merriam, of Locust Grove, N. Y., deposited two pairs of interlocked elk antlers.

Capt. O. M. Smith, U. S. Army, Fort Keogh, transmitted a Springfield bullet partially pierced by a nail at target range.

Nevada.—Mr. L. L. Frost, of Susanville, presented a flint perforator from Smoke Creek.

New Jersey.—From Mr. Theo. M. Ely, general superintendent of the Motive Power, Pennsylvania Railroad, Altoona, Pa., was received a car-wheel of the same class of wheels in use under the first locomotive and cars run on the New Jersey Railroad, and similar to those used under the cars when they were drawn by horses prior to the use of locomotives.

New Mexico.—From Capt. John G. Bourke, U. S. Army, were received ethnological objects and stone implements.

From the Department of Agriculture, through Dr. C. Hart Merriam, were received the jaw and radius of a bear from a cave in Grant County.

Dr. W. Matthews, U. S. Army, Fort Wingate, sent a pair of wooden tongs used by the Navajo women for picking cactus fruit.

From Mr. M. Metcalfe, of Silver City, was received a fork-tailed lizard (*Cnemidophorus gularis*).

From the U. S. Geological Survey, through Major J. W. Powell, director, was received a specimen of smoky quartz, collected by Mr. F. H. Knowlton in Santa Fe.

A large series of ores and economic minerals were collected and presented by Mr. F. W. Crosby, of Washington, D. C.

New York.—From Mr. Moses Eames, of Watertown, through Mr. N. F. Blount, of Washington, D. C., was deposited an old plow, which was awarded a premium by the Jefferson County Fair in 1820 for the best plow manufactured. The plow was manufactured by Col. William Lord in 1820.

Hon. Roswell P. Flower, M. C., presented an ancient iron ax, an English penny of date 1734, brass button, brass arrow-points, and stone tablet found near the ruins of Fort George.

From Mrs. F. M. Hartwell, of Washington, D. C., was received a foot-stove belonging to David Randall and used in the "Old Red Meeting House" in Dutchess County in 1788.

Mr. J. Scott Hartley, of New York City, presented life-size busts of Judge Noah Davis, Edwin Booth, Lawrence Barrett, and John Gilbert.

Mrs. Nellie Long Maynard, through Mr. George W. Maynard, of New York City, presented breech-loading guns, guns fitted with the Maynard system of priming—inventions of Dr. George Maynard—parts of Maynard rifle, wooden models of parts of guns, chargers, breech-block, hammer, and priming case, loading device, primed cartridges, cartridges, and priming strips (tapes).

From the New York Central and Hudson River Railroad Company, through Mr. William Buchanan, superintendent, was received one of the wheels of the locomotive "De Witt Clinton."

A specimen of Orthoceras from the Upper Devonian formation of New York was received from Mr. Oscar Potter, of Scott, N. Y.

Dr. William L. Ralph, of Utica, presented a nest and 3 eggs of *Sporo-*

phila morelleti sharpi; 8 eggs of *Parus atricristatus*, new to the collection; 2 eggs of *Chordeiles texensis;* 4 eggs of *Tyrannus melancholichus couchii*, new to the collection, and 2 eggs of *Columba flavirostris.*

The Syracuse Plow Company, of Syracuse, N. Y., presented a model of a steel plow.

The U. S. Geological Survey, through Mr. C. D. Walcott, presented 2 slabs of slate showing bedding, clearage, and faulting

Mr. Stephen Vail, of New York City, deposited a paper ribbon containing a record of the first Presidential election reported by electric telegraph, November 5, 1844.

North Carolina.—A collection containing 500 specimens of annelids from Beaufort and Virginia, was received from Dr. E. A. Andrews, of Baltimore, Md.

From Messrs. H. H. and C. S. Brimley, of Raleigh, were received 24 specimens representing 11 species of batrachians, among which is a fine series of what is believed to be Holbrook's *Salamander haldemanni*, a form apparently lost sight of since its original description.

From Mr. Frank Burns, of the Smithsonian Institution, was received a specimen of matting manufactured out of the leaf fiber of the Long leaved Pine (*Pinus palustris*), obtained from the manufactory at Cronly, near Wilmington.

Archæological specimens from the base of Roan Mountain were collected and transmitted by Mr. P. L. Jouy, of the National Museum.

Ohio.—Mr. Warren K. Moorehead, of Xenia, deposited the Simonton collection of aboriginal relics from Warren County.

From Prof. Edward Orton, of Columbus, were received 7 specimens of fossil plants from the Devonian and Carboniferous formation of Ohio.

Prof. F. W. Putnam, of Peabody Museum, Cambridge, Mass., transmitted an ancient iron lamp found in the remains of a fruit-drying house on the top of a mound in Adams County.

Oregon.—Dr. A. G. Prill, of Sweet Home, presented 11 eggs (one set) of the Ring-necked Pheasant (*Phaisanus torquatus*), an introduced species in the United States, new to the collection.

Pennsylvania.—Mr. Charles W. Cottom, of Dunbar, presented a piece of charcoal taken out of the ill-fated Hill Farm mine, some 1,500 feet from the mouth of the pit.

From Mr. S. M. Fletcher, of Lima, Ohio, through Hon. S. S. Yoder, was received a specimen of oil sandrock from the Union Oil Company well No. 9, Barse Track, McKean County. This specimen was found at the depth of 1,730 feet.

A silver medal of Franklin Institute, Philadelphia, presented in 1854 to Mr. Joseph Francis, of Minneapolis, was transmitted by him to the Museum.

From Messrs. Lindsay and Early was received as a loan the cylinder of the locomotive "Stourbridge Lion."

Two polished slabs of marble were received from Messrs. Schweyer and Liess, of King of Prussia, Montgomery County.

Mr. James Todd, of Pittsburg, presented a silver watch with fob-chain, seal, and pendant, supposed to have been taken from a British soldier at the battle of Lexington, 1775, by Lieut. Todd, of the Continental army.

From the U. S. Geological Survey, through Maj. J. W. Powell, director, were received samples of garnet, 4 specimens of garnet in muscovite, and 2 pieces of chalcedony, collected by Mr. E. A. Schneider in Delaware County.

South Carolina.—From Mr. James E. Benedict, of the National Museum, was received a collection of birds' skins, containing, among many other valuable and interesting species, one entirely new to the collection, *Cistothorus marianæ* Scott.

Mr. J. L. Black, managing director of the Magnetic Iron and Steel Ore Company, Blacksburgh, transmitted specimens of ore from the mines of the company.

From Mr. E. E. Jackson, of Columbus, were received archæological objects, consisting of shallow stone mortars, rubbing-stone, grooved axes, polished hatchet, leaf-shaped implement, arrow and spear-points, stone pendant with lines and dots, fragments of pottery, and fragments of potstone vessels.

Mr. W. C. Kendall, of the U. S. Fish Commission, transmitted 30 specimens of birds' skins, representing 27 species.

South Dakota.—Dr. Z. T. Daniel, Cheyenne River Agency, presented stone implements, teeth, and pottery found in the remains of Indian houses. The houses were formerly inhabited by the Rees tribe (Arikarees) of the Pawnee family. The specimens were collected at the suggestion of Gen. T. J. Morgan, Indian Commissioner. In addition, Dr. Daniel contributed the bones of a Sioux Indian found on the site of an ancient burial-tree on the Missouri River near the agency, and also buffalo horns.

From Mr. Frank D. Lewis, special agent, Indian Department, were received through Mr. F. J. Heiberger, of Washington, D. C., two "ghost shirts" from the site of the "Wounded Knee" fight.

Tennessee.—Mr. Tertsh Lander, of Williamston, presented specimens of coal plants from Tracy City.

A large series of ores and economic minerals from Texas were collected and presented to the Museum by Mr. F. W. Crosby, of Washington, D. C.

From the U. S. Geological Survey, through Maj. J. W. Powell, director, were received specimens of cretaceous fossils.

Utah.—Mr. Titus Ulke, of Hill City, S. Dak., presented a specimen of fibrous meerschaum from Little Cottonwood.

Virginia.—Dr. E. A. Andrews, of Baltimore, Md., presented a collection of annelids containing 500 specimens from Willoughby Sand Spit, and Beaufort, N. C.

From Mr. H. B. Battle, director of the North Carolina Agricultural

Experiment Station, Raleigh, was received a portion of the Henry County meteorite.

From the Randolph-Macon College, through Mr. Richard Irby, secretary and treasurer, was received a medal commemorating the incorporation of the college, February 3, 1830.

Mr. Henry Hemphill, of San Diego, Cal., presented tertiary fossils from Lake Whatcom.

Wisconsin.—From Dr. W. J. Hoffman, of the Bureau of Ethnology, were received a model of Menomonee medicine-man's grave with symbols; crayon sketch of the grave of Oshkosh, and of the great lodges of the Menomonee tribe, where funeral services are held over medicine-men on the anniversary of their death.

Wyoming.—From the Department of Agriculture, through Dr. C. Hart Merriam, were received specimens of fossil turtles and mammals from Fort Bridger.

From the U. S. Geological Survey, through Major J. W. Powell, director, were received 17 specimens of chalcedony, collected at Fossil Point by Prof. Lester F. Ward.

Miscellaneous.—From the American Historical Society were received, through Mr. A. Howard Clark, assistant secretary of the society, manuscripts, drawings, letters, etc., comprising the "Vail papers" relative to the invention and early application of the telegraph.

Dr. John Bartlett, of Chicago, Ill., transmitted a model of a Burmese canoe.

Mr. William J. Boyd, of Brooklyn, N. Y., presented a model of the vessel *Half Moon.*

Miss Mary Henry, of Washington, D. C., deposited the electro magnetic engine for producing reciprocating motion by magnetic attraction and repulsion, invented and constructed by Prof. Joseph Henry in 1851.

The gem collection of the late Dr. Joseph Leidy, containing 400 cut stones, was obtained by purchase from the heirs of Dr. Leidy's estate.

From Mr. Frederick S. Perkins, of Madison, Wis., by special appropriation of Congress, was purchased his large collection of prehistoric copper and galena objects, obtained principally from Wisconsin and Ohio.

From Mr. Frederick W. Porter, of Chicago, Ill., was received a collection of old State-bank notes from 1817 to 1860.

Prof. C. V. Riley, of the Department of Agriculture, transmitted a series of 400 species of coleoptera and 130 species of hemiptera, collected in the United States by Prof. L. Bruner, of Lincoln, Nebr.

The Hinds Ketcham Company, of Brooklyn, N. Y., transmitted a collection of incandescent lamps, switches, and other apparatus used in 1881 in connection with one of the earliest electric-light plants in America.

From the Singer Manufacturing Company, Hartford, Conn., were received 11 sewing-machines.

ISLANDS IN THE ATLANTIC OCEAN.

Bahama Islands.—Mr. Edward D'Invilliers, of Philadelphia, Pa., presented specimens of phosphates from the island of Navassa.

A specimen of Ani (*Crotophaga ani*) was received from Dr. T. F. R. Dufour, of Washington, D. C. This specimen was obtained from the island of Navassa.

Mr. I. Greegor, of Jacksonville, Fla., presented a remarkably fine series of *Tritonium femorale.*

WEST INDIES.

Mr. C. B. Cory, of Boston, Mass., presented 40 birds' skins, representing 25 species.

Lady Edith Blake, King's House, Jamaica, presented drawings of emblems of the Red Indian mythology and a water-color plate of Beothuck Indian ornaments.

From the Botanic Garden, Trinidad, was received a specimen of a newly discovered deposit of foraminiferous earth ("Philippine deposit"), from Naparima district, Trinidad.

SOUTH AMERICA.

ARGENTINE REPUBLIC.

From Mr. Henry Edwards, of New York City, were received alcoholic specimens of insects.

A very complete collection of woods of the Argentine Republic was presented by the Museo de Productos Argentinos, through Mr. John F. Thompson.

BRAZIL.

Mr. C. F. Brown, of Hot Springs, Ark., sent a specimen of yellow topaz.

Prof. Orville A. Derby, of the national museum of Brazil, through the courtesy of Prof. J. M. Clarke, University of the State of New York, New York State Museum, Albany, N. Y., transmitted trilobites from the paleozoic system of Brazil.

Hon. J. O. Kerby, United States consul at Para, presented 2 birds' skins from Brazil, and a few feathers of the Eigretei, a rich and rare bird of the heron species found on the island of Marajo, Amazon River; 11 specimens of South American Golden Tortoise-beetle (*Desmonota variolosa* Webb), and 3 pieces of the bark of the tree used by the Amazon Indians for paper.

Capt. A. V. Reed, U. S. Navy, presented a dragon fly (*Cordulegaster*) and a turtle.

Mr. C. W. Richmond, of the Department of Agriculture, sent in exchange two birds, *Pteroglossus castanotis* and *Colaptes campestris*, from Chapada, Province of Maranhão.

Dr. H. Von Ihering, of Rio Grande do Sul, sent 8 species of recent shells and 16 species of fossils; also a collection of fresh-water shells from the southern part of Brazil.

CHILE.

Messrs. Ward and Howell, of Rochester, N. Y., presented a fragment of a meteorite from Llano del Inca.

ECUADOR.

From Dr. Hugh M. Smith, of the U. S. Fish Commission, were received skins of the Golden-headed Manakin (*Pipra aurocapilla*) and Blue-crowned Manakin (*Pipra coronata*).

FRENCH GUIANA.

From Mr. Charles Bullman, of Plainfield, N. J., were received specimens of phosphates of alumina and iron, from the Island of Grand Cannetable.

PATAGONIA.

From the Royal Museum of Natural History, Berlin, Germany, was received, in exchange, a collection of echinoderms.

PERU.

Mr. F. T. Redwood, of Baltimore, Md., sent, in exchange, a wooden image.

From Mrs. J. H. Baxter, of Washington, D. C., were received on deposit 37 specimens of ancient Peruvian pottery collected by Mr. William Tryon, and presented by him to Surgeon-General Baxter. This collection is known as the "Tryon collection."

UNITED STATES OF COLOMBIA.

Mr. Charles Bullman, of Plainfield, N. J., presented a piece of bark-cloth called "damaqua," made by the Indians of Choco; a little paint-pot used by the Choco Indians to hold the red paint made from anatto seeds; a piece of lignite from gold and platinum alluviums, Condoto River, and specimens of gold and platinum from the same locality.

From Hon. Thomas Herran, of Hamburg, Germany, was obtained by purchase 9 golden ornaments of ancient Colombian workmanship, weighing 133 grams, taken from graves in the province of Antioquia. Mr. Herran also presented 2 pieces of ancient Indian pottery from a grave in the same locality.

VENEZUELA.

From Mr. R. M. Bartleman, of the United States legation, Carácas, was received a fine series of *Argonauta argo* and other marine shells; also a collection of insects.

A collection of fishes made by the steamer *Albatross* from the Galapagos Islands, was received from the U. S. Geological Survey, through Major J. W. Powell, director.

ASIA.

CHINA.

Canton.—Mr. P. L. Jouy, of the U. S. National Museum, deposited 2 double cutlasses.

Shanghai.—From the Department of State were received samples of ramie in various stages of manufacture, and a report regarding this industry by the United States Consul-general at Shanghai.

Wenchow.—Dr. D. J. Macgowen, through Hon. J. D. Kennedy, Consul-general, Shanghai, presented a sturgeon in alcohol, a pair of stockings, and two wooden models.

Mr. P. L. Jouy deposited 13 objects of mother-of-pearl, and 4 pieces of jade.

A collection of Chinese musical instruments was obtained for the Museum by Dr. Julius Neumann.

Mr. W. W. Rockhill, of Washington, D. C., deposited a collection of Chinese enamels, lacquers, and bronzes, Chinese swords, daggers, belt-knives, and chopsticks. Mr. Rockhill also presented a tobacco-pouch.

KOREA.

Mr. P. L. Jouy, of the U. S. National Museum, presented 3 stone implements, and a package of Korean tobacco, and deposited a collection of Korean religious objects.

Mr. W. W. Rockhill, of Washington, D. C., deposited a pair of shoes worn by Korean children, and a quiver filled with arrows.

INDIA.

Burma.—Through the courtesy of Mr. Henry Balfour, of Oxford, England, a bamboo blowpipe from Burma, was received in exchange, from the Oxford Museum, Oxford, England.

Mr. Edward Lovett, of Croydon, England, sent in exchange a brass lota.

Calcutta.—From the Royal Botanic Garden, through Dr. G. King, superintendent, was obtained by exchange, a collection of dried plants.

Madras.—Bishop John P. Newman, presented a mosaic dish, inlaid with variegated stones.

From the Royal Botanical Gardens, Kew, England, through Dr. W. T.

Thiselton-Dyer, director, was received in exchange, a collection of Indian fabrics.

From the Wesleyan University, Middletown, Conn., through Prof. William North Rice, was received a group of Indian idols.

JAPAN.

From Lieut. T. Dix Bolles, U. S., Navy, was received a fire-bowl.

W. Eagle Clarke, esq., of the Edinburgh Museum of Science and Art, Edinburgh, Scotland, sent in exchange a collection of birds' skins.

From Mr. Harry V. Henson, of Yokohama, were obtained by purchase 380 birds' skins from the island of Yezo.

Mr. Romyn Hitchcock presented Japanese alphabetical playing cards.

Mr. P. L. Jouy presented 2 shampooer's whistles and 2 clam-darts, and deposited a Japanese sword.

From Mr. H. Loomis, of Yokohama, were received cocoons of the ichneumon fly (*Apantelas sp.*), and 2 specimens of the work of the insect.

Mr. F. T. Redwood, of Baltimore, Md., sent, in exchange, a pair of Japanese swords and a hari-kiri dirk.

Mr. W. W. Rockhill, of Washington, D. C., presented Japanese swords, daggers, belt knives, and chopsticks.

From Mr. T. Tokuno, chief of the Insetsu Kioku, Tokyo, were received 6 sheets of color-prints from paintings by Japanese artists, and 5 illustrated Japanese books, consisting of nineteen volumes.

SIAM.

From Hon. S. H. Boyd, United States Consul-general, Bangkok, were received gambling cards and a set of dice.

Rev. H. S. Gorman, England, presented 30 specimens, representing 19 species of named coleoptera.

From the Royal Museum of Natural History, Berlin, Germany, was received a collection of echinoderms.

ASIATIC RUSSIA.

Bagdad.—From Rev. John P. Peters, of Philadelphia, Pa., were recieved a kufa, plow, yoke, spade, two guns, handle of pestle, and 2 paddles for kufa, collected by Dr. Peters for the National Museum.

Beirut.—From Mr. Stewart Culin, of Philadelphia, Pa., were received 2 packs of playing cards.

Mesopotamia.—Rev. John P. Peters, of Philadelphia, collected for the National Museum a number of ethnological objects illustrating the life of the Arabs of Mesopotamia.

ASIA MINOR.

From Col. S. F. Tappan, Washington, D. C., was received a shirt made of chain armor, captured by Hon. H. M. Stanley from brigands.

ISLANDS IN THE INDIAN OCEAN.

Ceylon.—From Mr. A. P. Gordon-Cumming, of Washington, D. C., was received a feather head-dress made by the Cinghalese.

From Prof. Henry A. Ward, of New York City, was received in exchange a specimen of Kelaart's Monkey (*Semnopithicus kelaartii*).

Mauritius.—From Mr. Edward S. Schmid, of Washington, D. C., was received a Mountain dove (*Geopelia setriata*).

From the Royal Museum of Natural History, Berlin, Germany, was received in exchange a collection of echinoderms. This collection was also obtained in part from the Kerguelen and Philippine Islands.

EUROPE.

AUSTRIA-HUNGARY.

From Mr. H. J. Johnston-Lavis, of Naples, Italy, were received in exchange specimens of minerals from Tyrol.

DENMARK.

From Dr. C. A. Norton, of Washington, D. C., was received a pair of fire-tongs brought to the United States in 1792, which were originally used for transporting coals of fire from one house to another.

FRANCE.

From Mr. Henry Balfour, of Oxford, England, were received in exchange 2 iron lamps used by bakers for lighting ovens and a spoon made of a pecten shell, and commonly used by the fishing people on the southern coast of Brittany.

From Mr. Charles Gindriez, director of the museum at Châlon-sur-Saône, was received in exchange through Mr. John Durand, of Paris, an impression from a heliograph "Portrait of Cardinal Amboise," from an engraving by Briot, made by Mr. Joseph Nicéphore Niepce in 1824.

Mr. Henry Balfour, of Oxford, England, transmitted in exchange a model of a shell lamp and a French crusie, of brass, from Normandy.

Prince Roland Bonaparte, of Paris, presented photographs of Somalis and of Hottentots.

The Department of State, through Hon. William Wharton, assistant secretary, transmitted 2 medals awarded to the Government of the United States for its exhibits at the late Paris International Exhibition, and 2 diplomas awarded to the United States from the same source.

Mr. George H. Draper, of Paris, France, through Mr. D. S. Lawson and Hon. J. W. Candler, presented an account-book of the Royal Treasurer under Louis XV, signed by Louis XVI, March 28, 1780.

From Mr. Joseph Francis, of Minneapolis, was received a silver medal presented to him by the Société Générale des Naufrages, in recognition of his services in connection with life-saving appliances.

Dr. Hilborn T. Cresson, of Philadelphia, Pa., deposited 5 flint objects from the cavern of Le Moustier.

GERMANY.

From Mr. J. B. Kevinski, of Lancaster, Pa., was received a clavichord brought to the United States about 1741.

A collection of echinoderms was received from the Royal Museum of Natural History, Berlin.

GREAT BRITAIN.

England.—From the Guildhall Library Committee, London, through Mr. Charles Welch, were received 6 copies of bronze medals issued by the corporation of the city of London and representing the visit of Queen Victoria to Guildhall, 1837; passing of the Reform Bill, 1832; opening of the London Bridge (large); opening of the London Bridge (small); thanksgiving at St. Paul's for the recovery of the Prince of Wales, and the opening of the City of London School.

From Mr. Edward Lovett, of Croydon, England, were obtained by exchange a knife found while excavations were being made at Temple Bar, and 11 pieces of pottery from Old London.

From the Royal Geographical Society, through Mr. H. W. Bates, assistant secretary, was received a bronze medal commemorating the Stanley expedition for the relief of Emin Pasha.

From Mr. Thomas Rogers, of Manchester, were received a number of specimens of *Planorbis dilatatus.*

From Mr. W. Eagle Clarke, Edinburgh Museum of Science and Art, Edinburgh, Scotland, were received in exchange birds' skins.

Mr. Thomas Ruddy, of Cowen, Wales, transmitted 232 specimens of Bala fossils.

Scotland.—From Mr. Henry Balfour, of Oxford, England, was received a model of a shell lamp found in the vicinity of the Orkney and Shelter islands.

From the U. S. Geological Survey, through Major J. W. Powell, director, were received 4 specimens of Devonian fish remains, collected by Mr. C. D. Walcott, of the Survey.

GREECE.

From Mr. R. Forrer were obtained by purchase a collection of Roman pottery and specimens of Coptic cloths.

From Mr. H. J. Johnston-Lavis, of Naples, Italy, were received specimens of minerals.

ITALY.

Catania.—The U. S. Department of State transmitted seven specimens of celestite with sulphur, collected by the United States Consul at Catania.

Florence.—From Supervising Surgeon-General John B. Hamilton, U. S. Marine Hospital service, was received a piece of wood, supposed

to be a piece of lignite, excavated from a mountain near Florence, and used in many parts of Italy for fuel.

Isle of Elba.—From Mr. J. G. McGuire was received a specimen of pyrite.

Leghorn.—From Hon. William T. Rice, United States Consul, were obtained 6 rare historical medals consisting of the following: Bronze medal, 1790, Rhode Island fight; silver medal, 1780, armed neutrality of Russia, Denmark, Sweden, and Holland during the war of independence of America, with the arms of the four States "Ichova wreeker der verbonden"; duplicate of the above medal; silver medal of 1784 "Médaille offerte par la Société." "Voorveÿheid in ÿver" to the State of Friesland, Holland, (Friesland arms) on the occasion of John Adams's reception as an ambassador of the United States; a silver medal representing the independence of the United States recognized by Holland "Libera soror" April 19, 1782, and a silver medal treaty of commerce between the United States and Holland, October 7, 1782.

Monte Gimmelaro.—From Mr. J. P. Iddings, of the U. S. Geological Survey, was received a specimen of basalt with inclusion of vitrified sandstone.

Sicily.—Mr. Joseph Francis, of Minneapolis, Minn., transmitted a gold medal presented to him by Ferdinand II, in recognition of his services in connection with life-saving appliances.

From the U. S. Geological Survey, through Maj. J. W. Powell, director, was received a crystal from Mineo.

Mr. H. J. Johnston-Lavis, of Naples, Italy, transmitted, in exchange, specimens of minerals and a series of eruptive rocks.

Mr. Edward P. Mason, of Boston, Mass., presented an Italian stringed "Salterio" about 120 years old, with an ornamental outer case, and several sheets of manuscript music by Pasquale Anfossi, a celebrated and successful dramatic composer in the years 1733–1795.

Mr. Thomas Wilson, of the U. S. National Museum, deposited a bronze sword, 20½ inches long.

NORWAY.

Arendal.—From Dr. W. F. Hillebrand, of the U. S. Geological Survey, was received a specimen of yttrogummite.

Christiania.—From Dr. Robert Collett, director of the Zoölogical Museum, was received, in exchange, the skeleton of a porpoise.

Trondhjem.—Dr. I. Hagen transmitted, in exchange, a collection of Norwegian mosses.

RUSSIA.

From Mr. Joseph Francis, of Minneapolis, Minn., was received a medal representing the insignia of the Order of Sr. Stanislaus, conferred upon him by the Emperor of Russia, in recognition of his services in connection with life-saving appliances.

From Mr. Theo. Holm, of the U. S. National Museum, was received a specimen of grogroilite from the Kara Sea, north of Siberia, collected by the Danish North Pole Expedition of 1882 and 1883.

From Mr. A. Lösch, of St. Petersburg, through Dr. E. A. Schneider of the U. S. Geological Survey, were received 2 specimens of xanthrophyllite (waluewite) and a specimen of ripidolite from Nikolaje Maximiliamowsk Mine, near Slatoust.

Dr. E. A. Norton, of the U. S. Geological Survey, presented a specimen of leuchtenbergite from Schischimsk, near Slatoust, southern Ural.

From the Royal Zoölogical Museum of Copenhagen, Denmark, through Prof. Dr. Chr. Lütken, were received, in exchange, 27 specimens (representing 11 species) of marine shells; 4 species of fishes, including *Liparis fabricii*, *Pycodes lütkeni*, *Icelus hamatus* and *Aspidophoroides olrikii*; a collection of crustaceans, echinoderms, bryozoans, worms, sponges, hyroids, and other specimens collected by the steamer *Dymphna* during an exploring expedition in 1882–'83 north of Russia, and the Kara Sea, Nova Zembla, and the Arctic regions.

Mrs. Mary I. Stroud, of Washington, D. C., deposited a collection of Russian minerals, presented in 1845 by the Russian Government to Prof. Walter R. Johnson, of Washington, D. C.

SPAIN.

Mr. S. P. Langley, secretary of the Smithsonian Institution, presented a pack of Spanish "Monte" cards collected by him in Spain, and 2 reed pipes of Moorish character.

Mr. W. W. Rockhill, of Washington, D. C., presented Moorish daggers and a short sword; also a Catalonian knife.

From Col. Seely, of the United States Patent Office, was obtained a collection of photographs representing ethnological objects. Col. Seely also presented a set of bronze weights and a brass clock.

SWEDEN.

From the Geological Survey of Sweden, Stockholm, were received in exchange 51 species of Cambrian fossils.

SWITZERLAND.

From Mr. Edward Lovett, of Croydon, England, were received in exchange a model of a Swiss fire-drill and a bronze fish-hook from the Swiss lake-dwellings.

TURKEY.

From Hon. O. S. Straus, of Constantinople, was received a cast of the Jerusalem stele, the original of which is in the Imperial Museum at Constantinople.

Objects of interest have been received from various parts of Europe, the exact localities from which some of them were obtained not being stated. Among them are the following:

Specimens of rocks sent in exchange by Prof. William H. Hobbs, of Madison, Wis.

From Mr. J. P. Iddings, of the U. S. Geological Survey, was received a volcanic bomb from the Island of Lipari, Mediterranean Sea.

Fourteen species of European *Caribidæ*, received in exchange from Mr. Paul Noel, of Rouen, France.

Sixty-two species of lepidoptera, received from the Department of Agriculture through Prof. C. V. Riley.

A collection of echinoderms, received in exchange from the Royal Museum of Natural History, Berlin, Germany.

Specimens of rocks, received in exchange from Mr. B. Sturtz, of Bonn, Prussia.

Alcoholic specimens of deep-sea fishes and the skin of a shark, transmitted by the Museum of Natural History, Paris, France, through Mr. Léon Vaillant, collected in the Atlantic Ocean and the Mediterranean Sea by the *Travailleur* and *Talisman* expeditions and by the Commission to Cape Horn.

OCEANICA.

AUSTRALASIA.

AUSTRALIA.

New South Wales.—From Mr. Walter Koehler, of Broken Hill, was received a very fine collection of minerals and rocks from the Broken Hill Mines.

From Mr. Titus Ulke, of Washington, D. C., was received a specimen of phosgenite from Broken Hill.

Baron Ferd von Müeller, of the Royal Botanical Gardens, Australia, presented fossil plants.

NEW CALEDONIA.

Mr. W. E. Traill, of Fort St. James, Stuart's Lake, British Columbia, presented alcoholic specimens of salmon.

NEW GUINEA.

From the Museum of Fine Arts, Boston, Mass. (through Gen. Charles G. Loring, director), was received a spear.

From the Royal Botanical Gardens of Kew, England, was received in exchange a collection of textile fabrics, specimens of materia medica, a mat, and other objects.

VICTORIA.

From Baron Ferd von Müeller, of the Royal Botonical Gardens, Australia, were received fossil fruits, consisting of *Spondylostrobus Smythii*, *Pleioclinis Sheperdi*, and *Conotheca turgida*. These specimens were transmitted to the National Museum through the courtesy of Mr. David White, of the U. S. Geological Survey.

NEW ZEALAND.

From Mr. Henry Edwards, of New York City, were received sponges and other marine specimens; alcoholic specimens of Dormouse Phalanger (*Dromicia concinna*) and alcoholic specimens of reptiles from the western part of Australia.

From the British Museum, London, England, through Dr. A. Günther, was received a collection of marine objects.

Mrs. C. C. Cox, of Washington, D. C., presented 3 eggs of the Australian emu.

POLYNESIA.

FIJI ISLANDS.

From Mr. Edward Lovett, of Croydon, England, were received in exchange a wooden dish, mallet, and tapa cloth.

Prof. I. C. White, West Virginia University, Morgantown, W. Va., transmitted in exchange a carved wooden vessel inlaid with shell and bone, and known as "priest bowls," collected by Lieut. W. I. Moore, U. S. Navy.

HAWAIIAN ISLANDS.

From Mr. A. F. Knudsen, of Cambridge, Mass., were received alcoholic specimens of *Mus musculus* and *Mus musculus (melanistio)*.

Dr. H. C. Bolton, of New York City, presented 3 photographs of Hawaiian surf-boards and surf-board riding.

SAMOAN ISLANDS.

From Lieut. T. Dix Bolles, U. S. Navy, was received a collection of ethnological objects, shells, sea-urchins, corals, echini, sponge, and a canoe with fittings. He also presented a basket and a gold mat.

ISLANDS IN THE PACIFIC OCEAN.

Marshall Islands.—From Lieut. T. Dix Bolles, U. S. Navy, was recieved a tapa cloth.

Paloa Islands.—From Capt. Frank Curling, in command of the American ship *Joseph D. Spinney* (through Capt. S. A. Day, U. S. Army), was received a dugout, found adrift 210 miles off the Paloa Islands.

NUMBER OF ACCESSIONS ANNUALLY SINCE 1881.

A tabulated statement showing the number of accessions to the Museum each year, beginning with 1881 (the first year of the occupancy of the new building), is here given.

Year.	Accession numbers (inclusive).	No. of accessions during the year.
1881	9890–11000	1,111
1882	11001–12500	1,500
1883	12501–13900	1,400
1884	13901–15550	1,650
1885 (January to June)	15551–16208	658
1885–'86	16209–17704	1,496
1886–'87	17705–19350	1,646
1887–'88	19351–20831	1,481
1888–'89	20832–22178	1,347
1889–'90	22179–23340	1,162
1890–'91	23341–24527	1,186
Total number of accessions from 1881 to June 30, 1891		14,637

The first entry in the Accession Book bears the date of January 1, 1859, although considerable material had been received before that time. From the above figures it will therefore be seen that the accessions during the past ten years largely exceed the total number received during the previous twenty-two years, or the period between 1859 and 1881.

I.—COÖPERATION OF THE DEPARTMENTS AND BUREAUS OF THE GOVERNMENT DURING THE YEAR ENDING JUNE 30, 1891.

The National Museum, as in past years, has been the recipient of many valuable and interesting contributions from the different bureaus of the Government. The U. S. Geological Survey and Fish Commission have as usual been very active in their friendly coöperation. The Department of Agriculture has contributed large and interesting collections, particularly from North America.

The officers of the Army and Navy have been instrumental in adding to the collections of the different departments and sections of the Museum, and the Quartermaster's Department has been efficient in its services, as has always been its custom. The Department of State has perhaps been more active in its contributions, particularly through its ministers and consuls, than in former years. In response to a letter from Secretary Langley, addressed to State Department officials in various foreign countries, and bearing the indorsment of that Department, some valuable accessions have been received and others promised. A report upon these contributions will be made in due course.

DEPARTMENT OF STATE.

From the Department, through Hon. William F. Wharton, assistant secretary, were received 2 diplomas awarded to the United States Government at the late Paris International Exhibition; a medal awarded to the Smithsonian Institution from the same source; and 2 medals awarded to the United States for its exhibits at the same exhibition.

Through Mr. Sevellon A. Brown, chief clerk, were received 2 large bricks, which appear to represent cunieform or other inscriptions; samples of Chinese ramie, in various stages of manufacture, and a report upon this industry written by the Consul-general of the United States at Shanghai.

From Mr. William E. Curtis, executive officer of the International American Conference, was received an album of portraits of the officers and members of the conference held at Washington in 1889–'90, and a photograph of Carib relics from St. Vincent.

From Mr. R. M. Bartleman, of the United States Legation at Carácas, Venezuela, were received specimens of insects; shells and salt from Cumana, alcoholic specimen of snake from Carácas, 2 gourds, and pieces of pottery; specimens of Cicadæ used for medicinal purposes, and, through Prof. Otis T. Mason, of the National Museum, Mr. Bartleman transmitted a fine series of *Argonauta argo* and other marine shells.

From Hon. S. H. Boyd, United States Consul-general at Bangkok, Siam, were received playing-cards used in Siam for gambling, and a set of dice.

Hon. J. O. Kerby, United States consul at Para, Brazil, presented, through Dr. Frank Baker, acting manager of the National Zoölogical Park, 2 specimens of birds' skins from Brazil, and a few feathers of the Eigretei, a rich and rare bird of the Heron species from the Island of Marajo, Amazon River; 11 specimens of South American Golden Tortoise-beetle (*Desmonota variolosa* Web.), and 3 pieces of the bark of the tree which the Amazon Indians use for paper.

Through Hon. J. D. Kennedy, Consul-general at Shanghai, China, were received, from Dr. D. J. Macgowan, Chinese customs, Wenchow, China, an alcoholic specimen of sturgeon, a pair of stockings, and 2 wooden models.

From Hon. William T. Rice, United States Consul at Leghorn, Italy, were obtained, by purchase, 6 rare medals, as follows: Bronze medal, 1779, Rhode Island fight; silver medal, 1780, armed neutrality of Russia, Denmark, Sweden, and Holland during the war of independence of America, with the arms of the four States "Ichova wreeker der verbonden;" a duplicate of the same medal; silver medal, 1784, Médaille offerte par la Société "Voorveÿheid en ÿver" to the State of Friesland, Holland (Friesland arms) on the occasion of the reception of John Adams as an ambassador of the United States; silver medal—the Inde-

pendence of the United States recognized by Holland "Libera soror," April 19, 1782; and a silver medal—Treaty of Commerce between the United States and Holland, October 7, 1782.

Seven specimens of celestite with sulphur crystals, procured from the largest sulphur mine in the province of Caltanissetta, Italy, were collected by the United States Consul at Catania, and transmitted to the Museum by the Department of State.

From Mr. Walter Koehler, of Broken Hill, Australia, through the State Department, was received a very beautiful collection of minerals, and also some specimens of ores.

The following consular officers have promised to assist in the collection of material: S. H. Boyd, Bangkok, Siam; C. C. Ellis, Rangoon, Bumah; Augustine Heard, Seoul, Corea; N. C. Gram, Iceland; Louis B. Grant, Cairo, Egypt; Victor A. Jenny, Macassar Celebes; James McIntosh, Tangiers, Morocco; E. Spencer Pratt, Teheran, Persia; E. D. Ropes, jr., Zanzibar, Africa; Harold M. Sewall, Apia, Samoa; Loudon A. Snowden, Athens, Greece; A. R. Webb, Philippine Islands; Erhard Bissinger, Beirut, Syria; Rounsevelle Wildman, Singapore, Straits Settlements.

TREASURY DEPARTMENT.

The National Museum is specially indebted to the Treasury Department for its valuable assistance in connection with the free entry of objects from foreign countries. Several valuable contributions have been made available in this way during the year. The bureaus of the Treasury Department have also shown much interest in the Museum, and special assistance has been rendered as follows:

Bureau of Printing and Engraving.—Through Hon. William M. Meredith, Chief of the Bureau, were received 262 unmounted Indian impressions of portraits, vignettes, and lathe-work.

Coast and Geodetic Survey.—Through Dr. T. C. Mendenhall, Superintendent, were received 69 specimens, consisting of fragments of human bones, clay vessels, and fragments of pottery from Pen Land, New River, N. C.

From Lieut. J. F. Moser, commanding steamer *Bache*, were received alcoholic specimens of fishes, snake, shells, and marine specimens from Florida Reefs.

Mr. E. D. Preston, of this Bureau, presented a crab, *Grapsus maculatus*, from Nonsuch Island, Bermuda Islands.

Revenue Marine Division.—Capt. W. C. Coulson, United States cutter *Rush*, presented the skin of a walrus, *Odobœnus obesus*, an adult male from Walrus Island, Bering Sea.

Marine Hospital Service.—Supervising Surgeon-General John B. Hamilton presented a piece of supposed lignite, from a mine near Florence, used for fuel.

WAR DEPARTMENT AND THE ARMY.

Several officers of the Army have contributed material, and the

Quartermaster's Department has rendered valuable assistance in connection with the transportation to Washington of bulky material for the Museum.

From Lieut. Col. J. G. C. Lee, Vancouver Barracks, Wash., was received the skull of a mammal found in Oregon.

Maj. John H. Wilcox, Fort Keogh, Mont., presented an Indian bow from Yellowstone Park, Wyoming.

Capt. Charles E. Bendire, honorary curator of birds' eggs in the National Museum, presented a parent specimen of *Dendroica cærula*, nest and 3 eggs, and also an egg of *Molothrus ater*, collected by Mr. W. E. C. Todd from near Beaver, Pa.

Capt. John G. Bourke, Fort Ringgold, Tex., deposited a stone-headed war club of the Dakota Indians, obtained from "Fog Whirlwind," one of Sitting Bull's warriors; a collection of ethnological and archæological objects from Arizona and New Mexico; a sling used by the Indians of Hidalgo, Mexico; and also presented some Mesquite beans.

From Capt. W. L. Carpenter, Whipple Barracks, Ariz., were received eggs and nests of *Spizella socialis arizonæ*, *Chondestes grammacus strigatus*, *Vireo huttoni stephensi*, *Psaltriparus minimus*, and *Icterus bullocki*; nests and eggs of Black-chinned Hummingbird (*Trochilus alexandri*), Western Wood Pewee (*Contopus richardsoni*), Lead-colored Bush-tit (*Psaltriparus plumbeus*), Woodhouse's Jay (*Aphelocoma woodhousei*) and Spurred Towhee (*Pipilo maculatus megalonyx*); nest and eggs of *Zenaidura macroura*, *Contopus richardsoni*, *Spizella socialis arizonæ*, and *Trochilus alexandri*; eggs of *Harporhynchus crissalis*, *Habia melanocephala*, *Mimus polyglottus*, *Icterus cucullatus nelsoni*, and *Chondestes grammacus strigatus*.

From Capt. Henry Romeyn, Fort Ringgold, Tex., were received 5 specimens of fossil oysters and a piece of petrified wood.

Capt. Thomas Sharp, Fort Russell, Wyo., presented anatomical specimens.

Capt. O. M. Smith, Fort Keogh, Mont., presented a Springfield bullet partially pierced by a nail at target range.

Lieut. Robert H. Fletcher presented gaming-sticks used by Hupa Indians of California; and Mr. Fletcher, through Dr. R. H. Fletcher, of the Army Medical Museum, presented a dance-stick, 2 arrows, and a photograph of the "White Deer Dance" of the Hupa Indians.

Lieut. J. S. Winn, Fort Huachuca, Ariz., sent a mammal skin from the Huachuca Mountains.

Lieut. W. W. Wotherspoon, through Capt. Henry Romeyn, presented 2 living snakes.

Dr. W. H. Forwood, of the Soldiers' Home, Washington, D. C., presented 20 crystals of sphene from Bridgewater, Pa., selenite crystal from Ohio, and 4 specimens of quartz from Crystal Mountain, near Hot Springs, Ark.

From Dr. W. T. Matthews, Fort Wingate, N. Mex., was received a pair of wooden tongs used by the Navajo women for picking the fruit

of the cactus, and also specimens of dyed wool from the Navajo sheep, and dyestuffs used by the Navajo women of New Mexico and Arizona.

Dr. Edgar A. Mearns, Fort Snelling, Minn., presented a specimen of Western Evening Grosbeck (*Coccotheraustes vespertinus montanus*), of first plumage and new to the collection.

Dr. J. C. Merrill, Fort Reno, Ind. T., presented a nest of *Vireo bellii*. Dr. Merrill also presented a small collection of Grasshopper-mice, Meadow-mice, a Cotton-rat, and three bats.

Dr. R. W. Shufeldt, Takoma Park, D. C., presented a specimen of *Dermognathus fusca* from Takoma Park; a Dragon-fly (*Tramea carolina*) from Maryland; 2 photographs of a Navajo woman weaving a belt; 8 alcoholic specimens of reptiles and batrachians, and 2 alcoholic specimens of tarantulas from Fort Wingate, N. Mex., and an Evening Grosbeck, a skin of mink (*Putorius vison*) from Sligo Creek, 3 alcoholic specimens of *Lagomys princeps* collected in the Sierra Nevada Mountains, an Evening Grosbeck in the flesh from Fort Wingate, N. Mex., and 2 snakes and a tree-frog from Takoma Park.

Rev. J. T. Potter, chaplain, Fort Clark, Tex., presented a skin of Massena Quail, *Cyrtonyx montezumæ*.

Mr. Charles Ruby, acting hospital steward, Fort Randall, S. Dak., presented fossil bones of reptiles and fish from Fort Randall, and also 4 specimens representing 3 species of birds' skins, comprising *Porzana carolina*, *Coccyzus erythropthalmus*, and *Setophaga ruticilla*.

Mr. G. J. Westerdahl, hospital steward, San Carlos, Ariz., presented a living Gila monster.

From Mr. E. R. Hodge, Army Medical Museum, was received a set of United States stamped envelopes, 2 cent issue of 1883.

Through the Quartermaster's Department, a bidarka and outfit from Akoutan Island was received from the Alaska Commercial Company, of San Francisco, Cal.

Six specimens of onyx from a quarry 28 miles from Prescott, Ariz., collected by Mr. William O. O'Neill, were transferred to the Museum through the courtesy of the Quartermaster's Department.

The important services rendered by Capt. Charles E. Bendire as honorary curator of birds' eggs in the National Museum, are very much appreciated. Most of the important additions of the year are the direct result of his active energy in developing the collection. Capt. Bendire has now completed his manuscript on the Life Histories of North American Birds, which will be published as a special bulletin of the Museum.

NAVY DEPARTMENT AND THE NAVY.

From Commander William L. Folger, chief of the Bureau of Ordnance, was received a specimen of nickeliferous pyrrhotite from Sudbury, Ontario, Canada.

Lieut. Commander F. Hanford collected a brass "fig-leaf," which was presented to the Museum by Dr. Hugh M. Smith, of the U. S. Fish Commission.

Capt. A. V. Reed presented a Dragon-fly (*Cordulegaster*) and a Turtle (*Testudo tabulata*) from Brazil.

Capt. Mason N. Shufeldt transmitted a collection of photographs, illustrating some of the ethnological objects collected during his voyages.

Lieut. T. Dix Bolles presented a collection of ethnological objects, 64 shells, sea-urchins, corals, echini, a canoe and its fittings, a basket, and a gold mat from Samoa; a tapa cloth from the Marshall Islands, and a fire-bowl from Japan.

Lieut. W. I. Moore, collected from the Fiji Islands, a carved wooden vessel inlaid with shell and bone, known as a "priest bowl." This object was presented to the Museum by Prof. I. O. White, of the West Virginia University, Morgantown, W. Va.

Lieut. Charles F. Pond presented specimens of grasshoppers and a firefly from Guatemala, Central America.

Mr. L. G. Billings, medical inspector, presented a collection of birds' skins, made by him during the recent cruise of the *Pensacola* to Africa. The collection also includes some specimens from St. Helena.

Mr. O. G. Dodge, of the U. S. Navy, collected 12 specimens of agatized wood, silicified wood, garnet pebbles, and smoky quartz, which were presented by the U. S. Geological Survey, through Major J. W. Powell, director.

The thanks of the Museum are due to Dr. James M. Flint, honorary curator of the section of materia medica, for the very efficient manner in which he has continued to administer the affairs of his section.

DEPARTMENT OF THE INTERIOR.

Through Hon. John W. Noble, Secretary, was received from Hon. J. C. Slocum, United States surveyor-general, Tallahassee, Fla., a collection of old surveying instruments, consisting of a transit comprising a telescope tube, a brass frame, a wooden tripod and detached legs, one solar compass (injured in a fire), a sextant in case, a standard chain, and a tripod and leveling-head for the solar compass.

Indian Office.—From Mr. George A. Allen, Indian agent, Colorado River Agency, Parker, Ariz., were received 4 photographs of the Mojave Indians; a collection of pressed flowers and plants; alcoholic specimens of insects; 4 lizards representing 3 species from the Colorado River Indian Reservation; ethnological objects, and 5 pieces of pottery from the Mojave Indians.

Dr. Z. T. Daniel, of Cheyenne River Agency, S. Dak., presented stone implements, teeth, and pottery found in the remains of Indian houses, circular mounds, from 10 to 50 feet in diameter, with depressed centers. These houses were formerly inhabited by the Rees Arickarees of the Pawnee family. These objects were collected by Dr. Daniel at the suggestion of Gen. T. J. Morgan, Commissioner of Indian Affairs. Dr. Daniel also presented scrapers, arrow-heads, and broken pieces or chips

from the ruins of houses formerly occupied by the Ree Indians; flint scrapers found on the ground of the agency, a flint scraper from near Fort Bennett, and a portion of a gun found by an Indian on the Custer battle-field.

From Mr. Frank D. Lewis, special agent, Indian Department, through Mr. T. J. Heiberger, of Washington, D. C., were received 2 ghost shirts from the late "Wounded Knee" Indian fight.

Patent Office.—From Col. J. W. Babson was received a patent granted to John W. Bronaugh and Jesse Talbot for a refrigerator, March, 1813, signed by James Madison, President, and James Monroe, Secretary of State.

From Col. F. A. Seely were obtained by purchase 27 photographs of ethnological objects from Spain.

U. S. Geological Survey.—The following statement will show the extent of the accessions from the survey during the year:

Through Major J. W. Powell, director, were received 111 photographs illustrating typical exposures of strata, contacts, folds, joints, etc.; 47 specimens of cretaceous fossils from Alabama, Mississippi, Texas, and Colorado; 4 specimens of minerals from Colorado and Arkansas, consisting of foliated kaolin, molybdenite, scheelite, and cuprodescloizite; a crystal from Mineo, Catania, Sicily; 2 geologic models, one labeled "Geologische Karte des Sentis, aufgenammen von Arnold Escher von der Linth," with sections set up according to the method proposed by Mr. Albert Heim, of Zurich, and the other representing one of a series prepared in wax and plaster by Mr. Willis in superintending the experiments upon the reproduction of geological structures by horizontal pressure; 4 specimens of apophyllite and a specimen of analcite from New Almaden, Cal.; specimen of cinnabar in barite from Almaden, Spain, crystallized cinnabar from the Reddington Mine, Knoxville district, California, and a collection of quicksilver (these collections were all made by Dr. G. F. Becker); 10 specimens of cerussite from Polonia Mine, Rosita, Colo., collected by Mr. Whitman Cross; silicified wood; 12 specimens of agatized wood, garnet pebbles, and smoky quartz, collected by Mr. O. G. Dodge, U. S. Navy; 2 specimens of gadolinite from Devils Head Mountain, Colorado, one specimen being the original material used by Mr. L. G. Eakins in identifying and describing the mineral from this locality (deposit); 3 specimens of minerals from Glastonbury, Conn., and 13 specimens from various localities in Colorado, most of it being the original material upon which Dr. Hillebrand, by whom the specimens were collected, has done scientific work; Dr. Hillebrand also collected 45 specimens of brochantite and malachite from the United Verde Mine, Jerome, Ariz.; 40 specimens of kyanite in quartz, 80 specimens of dumortierite in quartz, and 74 specimens of dumortierite in quartz from Clip, Ariz.; 3 specimens of white pulverulent sulphide of zinc from Galena, Kans., and 3 specimens of barite pseudomorph after crinoid stems and shells from Seda-

lia, Mo., collected by Dr. W. P. Jenney; specimen of agatized wood from Chalcedony Park, Ariz., and a specimen of smoky quartz from near Santa Fé, N. Mex., collected by Mr. F. H. Knowlton; minerals from Delaware County, Pa., 4 specimens of garnet, 4 of garnet in muscovite, and 2 of chalcedony, collected by Dr. E. A. Schneider; specimens of garnet, epidote and enargite, from Alpine County, Cal., collected by Mr. H. W. Turner; a specimen of *Gyroceras* (?) from the lower Carboniferous, Indiana, and 4 specimens of Devonian fish remains from Scotland, collected by Mr. Charles D. Walcott; 17 specimens of chalcedony from Fossil Point, Wyoming, collected by Prof. Lester F. Ward; specimen of chrome tourmaline from Montgomery County, Md., collected by Mr. Williams; 2 specimens of crinoids from the Trenton Limestone, Ottawa, Canada.

From Mr. Marcus Baker were received 28 specimens of *Helix thyroides* from Washington, D. C. Mr. Baker also forwarded for Mr. E. W. Boker, a Marmoset, *Hapale jacchus*.

From Dr. George F. Becker were received 2 specimens of iridosmine from California.

From Mr. Frank Burns was received a collection of fresh-water mollusks from the Potomac River.

Mr. W. H. Dall presented a collection of fresh-water shells from California and Oregon, a specimen of *Acridium americanum* from the District of Columbia, 2 specimens of *Chernes* sp., taken from a house-fly, 2 specimens of *Aspergillum vaginiferum* Lam., 8 specimens of *Strombus fasciatus*, and a specimen of *Bulimus Marielinus* from the Indo-Pacific, 5 specimens of *Bulla* sp. from Florida, and a turban from India.

From Dr. David T. Day was received a specimen of silica made by electrolysis from quartz, by the Herault Aluminum Company, of Boonton, N. J., a specimen of corundum from Shimersville, Pa., and 5 specimens of diaspore from Chester, Mass.

From Prof. J. S. Diller were received 2 specimens of conglomerate, one from near Point of Rocks, Md., and the other from near Leesburg, Va., and 2 specimens of conglomerates from Maryland.

Mr. William Hallock transmitted for Mr. J. C. Brady, of Wheeling, W. Va., a piece of carbon deposited by natural gas.

From Dr. W. F. Hillebrand was received a specimen of yttrogummite from Arendal, Norway.

Mr. J. P. Iddings presented a volcanic bomb from the island of Lipari, Mediterranean Sea, and a specimen of basalt with inclusion of vitrified sandstone from Monte Gimmelaro, Etna eruption of 1886.

From Dr. Walter P. Jenney was received a specimen of native lead, with minium and anglesite from Mineral Hill district, near Hailey, Alturas County, Idaho; specimen of native white sulphide of zinc from Moll mine, Galena, Kans., and 154 specimens of minerals consisting of eudialyte, manganopectolite, rutile, aegirite, monticellite, leucite, and vesuvianite obtained from Dr. Jenney by purchase.

From Mr. F. H. Knowlton was received a specimen of Spotted Turtle (*Chelopus guttatus*) from Laurel, Md., and through Mr. Knowlton was received a specimen of *Platysamia columbia* Grote, from Montana, transmitted by Mr. E. F. Hanly, of Bozeman. Mr. Knowlton presented 2 samples of lignite from the Potomac formation near Richmond, Va.

From Mr. S. Ward Loper, assistant geologist, Middletown, Conn., was received a specimen of folded gneiss and a specimen of Triassic trap-rock from Baileyville, Conn.

From Dr. W. H. Melville was received a specimen of bismuthinite, with chalcopyrite in quartz, from Mariposa mine, Rosario district, Sinaloa, Mexico, and from Dr. Melville were also received specimens of napalite, cinnabar, metastibnite, elaterite, and livingstonite.

From Dr. A. C. Peale was received a sample of "Diamond Polish" (volcanic dust) from the Diamond Emery Company, Phillipsburg, Kans.

From Mr. I. C. Russell were received 3 specimens of coal from Alaska and Vancouver Island, a pouch of leather from Yakutat, Alaska, containing a stone fish used as a charm by medicine man, 2 stone mortars, an adze, a stone implement, and 2 faulted pebbles from Pinnacle Pass, Mount St. Elias, Alaska.

From Dr. E. A. Schneider was received a specimen of leuchtenbergite from Schischimsk, near Slatoüst, Southern Ural, Russia, and through Dr. Schneider was transmitted from Mr. A. Lösch, of St. Petersburg, Russia, 2 specimens of xanthophyllite (waluewite) and a specimen of ripidolite from Nikolaje-Maximilianowsk mine, near Slatoüst, Siberia.

From Mr. T. W. Stanton were received 18 arrow-points, found in a field on Cowikee Creek, near Eufaula, Ala.

Through Mr. C. D. Walcott was received a mud-marked limestone slab from Rathbone Brook, Herkimer County, N. Y., and 2 slabs of slate showing bedding, clearage, and faulting.

From Prof. Lester A. Ward were received 2 fine specimens of *Zamia integrifolia* from Florida, and a natural grafting illustrated by specimens from black-oak trees.

From W. C. Weed were received 2 specimens of coal from Cinnabar Coal Field, Montana.

Dr. C. A. White presented a collection of mixed shells from Iowa and other localities, a gorgonian, specimens of gypsum, and a stalactite.

Several of the honorary curators in the National Museum are officers of the Geological Survey, and the Museum is much indebted to them for their coöperation with its work. These are: Mr. C. D. Walcott, in charge of paleozoic fossils; Dr. C. A. White, in charge of mesozoic fossils; Mr. William H. Dall, in charge of mollusks and cenozoic fossils, with Dr. R. E. C. Stearns as adjunct curator; Prof. Lester A. Ward, in charge of fossil plants; Prof. F. W. Clarke, in charge of minerals, and Prof. O. C. Marsh, in charge of vertebrate fossils.

DEPARTMENT OF AGRICULTURE.

From the Department of Agriculture, through the Secretary, have been received the following objects:

Twenty-seven photolithographs illustrating the forest destruction and reforestration in France, 2 maps showing the forest distribution, 100 small label maps representing the distribution of species, a section of a tulip tree and a historical chart of its growth were deposited.

Numerous collections have been received from the divisions of animal industry, entomology, botany, forestry, and economic ornithology and mammalogy. The following statement shows the extent of the material contributed.

Through Dr. C. Hart Merriam, fossils from Fort Bridger, Wyo., and fragments of the jaw and radius of a bear from Grant County, N. Mex.; 11 specimens of land shells from Texas, representing 4 species; 5 horned toads (*Phrynosoma brevirostre*), collected by Mr. V. Bailey in Idaho; specimens of *Exogyra arietina* from Painted Cave, Rio Grande Bank, Texas, and 9 species of land and fresh-water shells from the same locality, collected by Mr. William Lloyd; 2 turtles representing 2 species from Texas (deposit); a Pacific Pine-snake (*Pituophis catenifer*) from Marshall, Wash. (deposit); a woman's suit, suit of a man, boots, pantaloons, etc., and a sleeping-bag obtained from the Eskimos of West Greenland; beadwork of the Piegan Indians of Montana, and pouches of the Montagnais Indians of Canada, collected by Dr. F. H. Hoadley (deposit); a specimen of Bruennich's Murre (*Uria bruennichii*) from Throg's Neck, Long Island, collected by Mr. A. Ferreira; 5 species of land-shells, collected by Mr. William Lloyd, and 31 reptiles and batrachians from Idaho (deposit).

Through Prof. C. V. Riley: Specimens of alcoholic insects, chiefly coleoptera from southern California, collected by Mr. D. W. Coquillet, of Los Angeles; 383 species of North American lepidoptera and 62 species of European lepidoptera; 54 species of coleoptera, collected in California by Mr. Coquillet, some of the species being new to the collection; 110 specimens representing 54 species of North American coleoptera, many of which are new to the collection, collected by Mr. H. F. Wickham, of Iowa City, Iowa; collection of insects, made by Prof. L. Bruner, of Lincoln, Nebr., consisting of 225 species of coleoptera from the United States; 20 species of coleoptera from Mexico; 29 species of hemiptera from Mexico and the United States; 75 species of hymenoptera from the same localities; 4 species of diptera from the United States; 1 species of neuroptera from the United States, and 6 specimens of *Vanessa californica* from Idaho; 25 species of North American coleoptera retained from a collection sent by Prof. A. J. Cooke, of Lansing, Mich., for identification, and transferred to the Museum by Prof. Riley; 425 specimens representing 60 species of lepidoptera, and 2,400 specimens representing 375 species of coleoptera, collected in California and Washington by Mr. A. Koebele; 30 species of coleoptera collected by

Mr. Coquillet in southern California; 400 species of coleoptera and 130 species of hemiptera, collected by Prof. L. Bruner; 71 species of North American coleoptera collected by Prof. Bruner, some of which are new to the collection, and a series of lepidoptera, 17 specimens representing 17 species, and 200 specimens of coleoptera representing 20 species, most of which are rare and valuable, collected in San Diego County, Cal., by Mr. Coquillet.

The following contributions have been received from the officials and other employés of the Department.

From Mr. H. B. Ayres were received 7 specimens of ores of iron and manganese from Minnesota and Dakota.

From Mr. Nathan Banks were received 10 species of coleoptera, among which was a specimen of *Zacotus matthewii* Lac., collected by Mr. Trevor Kincaid, of Olympia, Wash., and also 20 species of arachnida, all new to the collection.

Mr. W. B. Barrows, presented 2 snakes from Brookland, D. C., one of which was a blotched kingsnake (*Ophibolus rhombomaculatus*).

From Dr. B. E. Fernow was received a model of a tree-planting machine invented by Mr. Thomas Stratton, and a view of a Japanese cedar (*Cryptomeria Japonica*).

Mr. O. Heidemann presented 6 specimens of *Neoborus petitii* Uhl.

From Dr. C. Hart Merriam were received 3 eggs of *Spizella breweri;* 3 species of fresh-water gastropods from Salmon River, and one species from Needle Peak, Idaho; numerous specimens representing 4 species of fresh-water mollusks from Salmon River and Shoshone Falls, Idaho; 2 specimens of fossil wood from Elm Creek, New Eagle Pass, Texas; 9 specimens of carboniferous limestone fossils, *Zaphrentis* sp., from Needle Peak, Idaho; a skin of Indian flamingo (*Phœnicopterus andersoni*), new to the collection; through Mr. W. B. Barrows, a worm (*Aphrodita aculeata*), 4 specimens repesenting 2 species of ascidians, 2 shrimps, and dry shells, collected in and near the Island of Grand Manan, New Brunswick, by Mr. S. F. Cheney; and a horned toad (*Phrynosoma coronatum*) from Twin Oaks, San Diego County, Cal.

From Mr. C. W. Richmond was received a slate-colored junco (*Junco hyemalis*) from Washington, D. C.

From Prof. C. V. Riley was received a collection of *Tineidæ* containing 900 specimens representing about 430 North American species, and 500 specimens representing about 140 European species; 1,100 specimens representing about 240 North American species of microlepidoptera, and small land-shells from Blanco County, Texas.

Mr. E. A. Schwarz presented 2 species of *Bittacus*, new to the collection, from Fort Pendleton, Maryland.

The very valuable services rendered by Prof. Riley, honorary curator of insects; Dr. B. E. Fernow, honorary curator of the section of forestry; and Dr. George Vasey, as honorary curator of the Department of Botany, have been continued.

UNITED STATES FISH COMMISSION.

The following collections and contributions have been transmitted to the National Museum, through Col. Marshall McDonald, U. S. Commissioner of Fisheries:

Twenty-eight specimens of fishes, collected by the steamer *Albatross* on the Pacific coast of North America during 1889, being the types of the new species recently described by Prof. Charles H. Gilbert in the "Proceedings of the National Museum;" specimen of Rainbow-trout (*Salmo irideus*) artificially reared at Bucksport, Me., and 2 specimens of the Black-fin White-fish (*Coregonus nigripinnis*), collected in Milton Lake, Minnesota, by Mr. James R. B. Van Cleane; a collection of 60 species of fishes from the vicinity of Charles City, Va., collected by Mr. W. P. Seal, during September and October, 1890; a collection of 1,128 specimens, representing 33 species of brachyuran and anomouran crustaceans, collected by the *Albatross* on the Pacific coast of North America; 327 specimens of echini obtained from the collections of the *Albatross* in the North Pacific Ocean; a small collection of brachyuran crustaceans obtained by the steamer *Grampus* off the coast of Florida; an alcoholic collection of the type series of fresh-water fishes, collected during the summer of 1889 in Missouri, Arkansas, Colorado, Utah, Alabama, and Georgia, by Prof. S. E. Meek, Dr. D. S. Jordan, C. H. Bollman, B. Fesler, and others; a collection of fishes, numbering 90 specimens, made by the *Albatross* from the Galapagos Islands and Panama, during the spring of 1888; a collection of mollusks, numbering 163 specimens, collected by the schooner *Grampus* off the west coast of Florida during the spring of 1889; a collection of fishes, chiefly from Brazil and some from Georgia and Alabama, made by the *Albatross* during the cruise from Norfolk and San Francisco during 1887–'88; fishes and reptiles collected in Alabama by Mr. P. H. Kirsch and party in 1889; a collection of fishes made in Georgia in 1889 by Messrs. C. H. Bollman and Bert. Fesler; a small collection of fishes comprising *Halichœres radiatus*, *Lutjanus analis*, *Malthe radiata*, *Eulamia limbata*, and *Lepomis pallidus*, from Florida, made by Dr. J. A. Henshall in 1889; fishes from the Gulf of Mexico, obtained by the *Grampus;* 447 specimens of crabs belonging to the genus *Panopeus*, collected by the Fish Commission during recent years; and specimens of a small variety of barnacle attached to the rushes on the shore of Clear Water Harbor, Florida, collected by Mr. W. H. Abbott.

From Mr. J. E. Benedict of the steamer *Fish Hawk* was received a skin of Red-tailed Hawk (*Buteo borealis*), from Bulls Island, Calibogue Sound, South Carolina.

Mr. W. C. Kendall presented 30 birds' skins, representing 27 species, from near Port Royal, S. C.

From Dr. Hugh M. Smith was received a collection of dried plants, representing 22 species, obtained by him at various littoral points

in New Jersey and Virginia; a stone taken from the stomach of a Coot (*Fulica americana*) from Roanoke Island, North Carolina; a small collection of dried plants from St. George's Island, Maryland; a brass "fig leaf" collected by Lieut. Commander F. Hanford, U. S. Navy; 2 birds' skins, Golden-headed Manakin (*Pipra aurocapilla*) and Blue-crowned Manakin (*Pipra coronata*), from Ecuador, South America; skin of Western Horned Owl (*Bubo virginianus subarcticus*), from New Mexico; specimens of *Pecten magellanus*, from the coast of Maine; 10 species of pressed plants from St. George's Island, Maryland; nests and eggs of *Vireo flavifrons*, *Vireo olivaceus*, *Dendroica æstiva*, *Dendroica discolor*, *Contopus virens*, *Falco sparverius*, and *Ægialitis vocifera*, from the District of Columbia; 2 water snakes, *Tropidonotus sipedo*, from the Potomac River; 13 small turtles from the Potomac River collected by Mr. William P. Seal, and 4 photographs showing a side-wheel steam-packet, the raising of a wreck in Norfolk Harbor, and the wreck of a four-masted schooner.

The valuable services of Mr. Richard Rathbun as honorary curator of Marine Invertebrates; Dr. Tarleton H. Bean, as honorary curator of Fishes, and Capt. J. W. Collins as honorary curator of Fisheries and Naval Architecture have, through the courtesy of Col. McDonald, U. S. Commissioner of Fisheries, been continued.

BUREAU OF ETHNOLOGY.

The following contributions have been received from the bureau and its officers:

A collection of enthnological and archæological material and specimens of pottery was transferred to the Museum by Maj. J. W. Powell, director.

From Dr. H. W. Henshaw was received a specimen of *Ophibolus rhombomaculatus*, from Falls Church, Va.

Dr. J. W. Hoffman presented a model of Menomonee medicine-man's grave with symbols; a crayon sketch of Oshkosh, and the great lodges of the Menomonee tribe where funeral services are held over the medicine-man on the anniversary of his death.

From Mr. James Mooney was received a pair of Cherokee ball sticks.

J.—REVIEW OF THE RESULTS OF THE COÖPERATION OF THE GOVERNMENT DEPARTMENTS AND BUREAUS DURING THE DECADE ENDING JUNE 30, 1891.

When the enormous increase, during the last decade, in the extent and importance of the Museum collections, from a scientific as well as from a popular standpoint, is taken into consideration, it seems proper to make special mention of the important results derived during that period from the system of coöperation inaugurated many years ago

between the Smithsonian Institution and the various departments and bureaus of the Government. The collections made by the Wilkes exploring expedition, the Perry expedition to Japan, and other naval expeditions, and the material gathered by the scientific officers of the Pacific Railroad survey, the Mexican Boundary survey, and the surveys carried on by the Engineer Corps of the Army, constitute the very groundwork of the collections, the nucleus upon which has been built its present structure. Indeed, had it not been for this coöperation on the part of the Government departments, the successful development of the collections would be extremely difficult, perhaps impossible, with the limited resources at the command of the Museum. The friendly interest displayed by officials at home and abroad, at all times and in every capacity, not only when officially detailed but during the leisure hours at their disposal, is worthy of the greatest praise and encouragement. Nor has this interest been confined to any one bureau or department. The friendly competition which has been engendered has aroused to action officers in almost every bureau of each of the departments. This interest has been shown not only in the collection of an enormous amount of material, but in its proper preservation and careful transportation to Washington, when collected.

The special ways in which this coöperation on the part of the departments and bureaus of the Government has manifested itself, may be thus enumerated:

(1) By assistance rendered to persons conducting investigations for the Smithsonian Institution.

(2) By the direct effort of Government officials in making collections for the National Museum, which is under the direction of the Smithsonian Institution.

(3) By the willingness of Government officials at distant points to notify the Institution of the occurrence of remarkable specimens and phenomena.

(4) By the transfer to the National Museum of collections which had been deposited in one or another of the departments for safe-keeping.

(5) By assigning persons to the Smithsonian Institution for special training, with a view to enabling them to observe accurately and to collect intelligently when afterwards engaged in their regular duties. (This is applicable chiefly to the Navy Department.)

(6) By transmitting to the Institution the results of observations as well as collections made by officers, at their post of duty, in behalf of the Institution.

(7) By assistance rendered in connection with the transportation of collections to Washington.

(8) By the receipt of collections made by other departments of the Government service, and studied and identified by officers of those departments before being transferred to the custody of the Museum.

(9) By the detail of officers connected with various departments and

bureaus of the Government, to act as honorary curators of collections in the National Museum.

A brief résumé of the special manner in which each department has contributed to the welfare of the National Museum, is here presented.

DEPARTMENT OF STATE.

The ministers, consuls, and other officers of the Department have always shown a great willingness to further the interests of the National Museum in foreign countries. Through the courtesy of the Department letters of introduction to them have been furnished from time to time, at the request of the Secretary of the Smithsonian Institution, and they have frequently been requested by the Secretary of State to aid persons collecting for the Museum. The Department has also kindly indorsed and forwarded letters from the Institution to its ministers and other officers, asking their coöperation in securing special desiderata to fill important gaps in the Museum collections.

Valuable assistance has also been rendered by the State Department in obtaining special facilities in connection with the exportation from foreign countries of material intended for the Museum. Among the most important accessions acquired through the coöperation of the Department and its officers may be mentioned the following: Specimens of native handiwork from Western Africa, sent by Mr. Smyth, the United States minister at Liberia; a collection of samples of wool from the Technological Museum at Sydney, New South Wales, through Hon. G. W. Griffin, United States consul at Sydney; a collection of antique copper, silver, and gold coins from Ceylon, Europe, the United States, and South America, from Hon. William T. Rice, United States consul at Horgen, Switzerland; a canoe similar to those in use by the natives of Hawaii, presented by the Queen of Hawaii; specimens of iron ore coal, and coke from Rio Grande de Sul; a collection of woolen, worsted, silk, and cotton fabrics, gathered by Hon. W. F. Grinnell, United States consul at Bradford, England; specimens of sisal, through Hon. Thomas J. McLain, United States consul at Nassau, West Indies, and a piece of rope made of human hair and used in hoisting building material in the construction of a Buddhist temple at Kyoto, Japan, transmitted by Hon. John T. Swift, United States consul at Tokio, Japan.

TREASURY DEPARTMENT.

The Treasury Department has extended its friendly offices in connection with the free entry of material from abroad, and has greatly aided the work of Museum investigators by allowing the free entry of scientific outfits. Through the courtesy of the Department a valuable collection of diamonds, pearls, and gold ornaments, which was presented in 1840 to the United States Government by the Imaum of Muscat, and

had been kept in a vault in the Treasury Department until 1887, when it was transferred to the Museum.

The U. S. Coast and Geodetic Survey and the Revenue Marine Division have frequently afforded special facilities to Museum explorers. Valuable contributions of material and information have been made by officers of the Light-House Board and the Life-Saving Service. Specialists sent out by the Museum have, through the courtesy of the Superintendent of the Coast and Geodetic Survey, been supplied with charts of the regions along the coast to be explored. In April, 1880, Dr. Tarleton H. Bean was detailed to visit Alaska to collect fishery statistics, fishes, birds, and other objects of interest. Through the courtesy of the Coast Survey he was permitted to accompany the expedition on the schooner *Yukon*, and was given all possible assistance and facilities in making collections. More than eighty species of fishes and fifty species of birds were obtained on that occasion. The Coast Survey, in connection with the Smithsonian Institution, secured important information as to the relative height of points upon the surface of the North American continent. Mr. W. J. Fisher, who was stationed at Kadiak, Alaska, gathered much valuable material relative to the manners and characteristics of the native tribes. On the occasion of the visit of Mr. Henry Elliott to the seal islands of Alaska, on business of the United States Government, the Secretary of the Treasury kindly permitted a taxidermist, selected by the Smithsonian Institution, to accompany him for the purpose of collecting specimens for the Museum, and extended important aid in facilitating the preservation of the material secured.

The interest in the photographic exhibit of the Museum at the Cincinnati Exposition was materially increased by a set of photographs illustrating the methods of mounting prints, obtained through the courtesy of the Superintendent of the Coast and Geodetic Survey, and a collection of photographs of counterfeiters, illustrating the uses to which photography has been applied in connection with the requirements of the Government service, was secured, through the kind offices of Mr. John S. Bell, Chief of the Secret Service Division. An interesting series of proofs of the current bonds and currency notes, and of gold and silver certificates, coupons, and registered bonds, was presented by the Chief of the Bureau of Engraving and Printing.

In 1881, under instruction of the Treasury Department, through Mr. E. W. Clarke, Chief of the Bureau of Revenue Marine, Capt. Hooper, in command of the revenue cutter *Corwin*, visited the Arctic coast. He was instructed to take Mr. Nelson, an agent of the National Museum, to St. Michaels, and give him an opportunity to visit St. Lawrence Island for the purpose of collecting Eskimo objects. Mr. Nelson obtained on the island, in addition to a fine collection of implements, utensils, dresses, etc., a large number of crania, filling an important deficiency in the Museum collections. In 1884 the Chief of the Bureau

of Revenue Marine, instructed its captains in Alaska to assist Mr. James G. Swan in his explorations for the Institution, by receiving him and his collections on board, whenever such action did not interfere with the regular service of the vessels. The commander of the revenue steamer *Key West* was instructed to assist Mr. Hemphill in carrying on his explorations of the Florida Keys in behalf of the Museum. In 1885 the *Corwin* again visited the Arctic Ocean, and parties were sent up the Kowak and other rivers emptying into Kotzebue Sound. Mr. Charles H. Townsend, an experienced collector, accompanied the vessel, and collected many interesting objects in ethnology and natural history. During the year 1887 the assistance of the Revenue Marine Division was asked in procuring for the Museum specimens of "bidarkas" or Eskimo kyaks. Capt. Healy was requested to obtain specimens on his next visit to Alaska, and upon his return six of these objects were placed in the hands of the Alaska Commercial Company for shipment to Washington.

A most important research into the natural history of the Atlantic coast of the United States has been carried on by the Institution with the coöperation of Mr. S. I. Kimball, Superintendent of the Life-Saving Service. In the early part of 1883, circulars from the Institution were distributed by him, asking the keepers of life-saving stations for telegraphic notification of the occurrence or capture of any remarkable marine animal. This arrangement has been productive of many interesting and valuable results. The specimens received are often of great scientific importance, and it is hoped that the system may continue to be as productive of good results in the future as it has been in the past.

The Light-House Board has extended aid by instructing the keepers of light-houses and light-ships to make observations in regard to the temperature of the air and water, as well as to notice the occurrence of phenomena in connection with the migrations of marine animals. The data accumulated from this source have been of the utmost importance in connection with the general problems of ocean physics, and have been used to great advantage in solving many questions concerning the movements of fishes in relation to their physical surroundings. The keepers were also instructed to note the course of birds, especially as evidenced by their falling to the ground after striking against the light-houses on dark nights. The Light-House Board also kindly contributed to the Museum exhibit at the Cincinnati Exposition an interesting collection of cyanotype prints, showing the lights and flames used in the light-houses on the American coast.

WAR DEPARTMENT.

Through the courtesy of the Secretary of War and the Adjutant-General of the Army, instructions were given to the commanders of the military posts at Fort Keogh and Fort Maginnis, Mont., and Fort

McKinney, Wyo., to render all assistance in their power to Mr. Hornaday, the chief taxidermist of the Smithsonian Institution, and his party of assistants, who started in June, 1886, for Montana and Wyoming for the purpose of securing specimens of buffalo. Mr. H. H. Rusby, a well-known botanist of New Jersey, was engaged in 1880 in investigating the botany, natural history, and archæology of New Mexico, and the War Department furnished some important facilities to aid him in his researches.

For many years the Secretary of War has permitted the quartermasters of the Army to forward from their posts boxes containing specimens intended for the National Museum. The transportation of 4 living buffaloes from Rapid City, S. Dak., to Washington, was greatly facilitated by Lieut. Col. William B. Hughes, chief quartermaster, Department of the Platte, at Omaha, Nebr., and by Capt. C. A. H. McCauley, now depot quartermaster at Portland, Oregon. A mahogany gun carriage, from the citadel of Santo Domingo City, was transmitted by Lieut. Col. G. L. Gillespie, of Engineer Corps, U. S. Army. Important assistance in securing collections and information has also been rendered by officers of the Army stationed at various posts throughout the country. Dr. R. W. Shufeldt, while detailed as medical officer at Fort Wingate, N. Mex., forwarded much interesting material and information.

Owing to the close relationship which had always existed between the Smithsonian Institution and the United States Signal Service, the coöperation of the latter in the prosecution of scientific researches, particularly in Arctic America, has resulted in most important additions to our knowledge of the natural history and ethnology of the countries north of the United States. Especial service has been rendered in this direction by Mr. Lucien M. Turner, who was detailed to Alaska by the Signal Service. In addition to the valuable collections made by him, he devoted much time to the study of the languages and customs of the people of that country, of whom little had been previously known. He also made many instructive and interesting observations relating to the natural history and ethnology of Northern Labrador, where he was attached to one of the Signal Service stations for several years. In 1886 it was found expedient to withdraw these stations from the outposts of Alaska and other northern countries, and thus the Museum was cut off from a most valuable field of research. Through the courtesy of Gen. A. W. Greely, Chief Signal Officer, photographs of meteorological records were contributed to the Museum exhibit at the Cincinnati Exposition, and a Secchi meteorograph, two sections of Beck's pantograph, and Meyers's autographic instrument, were added to the collection of scientific apparatus in the Museum. The results of twenty-five years meteorological correspondence and research, which had been conducted by the Smithsonian Institution, were transferred by it to the Signal Office, in accordance with the time-honored practice of the Institution,

namely, to discontinue research in any subject which is covered by the operations of any other branch of the service.

An arrangement has for several years been carried out with the Surgeon-General of the Army, by which the Smithsonian Institution transfers all its human crania to the Army Medical Museum, and receives in exchange skeletons and skulls of North American vertebrates. An agreement was also entered into between the National Museum and the Army Medical Museum, by which the latter undertakes to make post-mortem examinations of animals in the flesh received by the Smithsonian Institution, with the understanding that the Army Medical Museum retains the viscera of such animals, and returns the skeletons, unless otherwise specified, to the National Museum.

In 1888 several interesting objects were turned over to the Museum by the War Department. Gen. S. V. Benét transmitted from the Ordnance Museum a plaster model of the equestrian statue of Gen. McPherson; a section of an oak tree cut down by musket balls near Spottsylvania court-house, Va., and presented to the War Department by Gen. N. A. Miles, U. S. Army; and a Mexican saddle and bridle, manufactured in Mexico for Gen. Trevino, commanding the northern line of Mexico, and presented by him to Gen. E. O. C. Ord, U. S. Army.

Valuable services have been rendered by Capt. Charles E. Bendire and Dr. Henry C. Yarrow, of the Army, as honorary members of the Museum staff.

NAVY DEPARTMENT.

In 1881 the Navy Department expressed a desire to assign six recently appointed midshipmen to the Smithsonian Institution for the purpose of familiarizing themselves with the routine work of the scientific departments in the National Museum, in order that they might be able to take advantage of the training in case opportunity for natural history research should arise in connection with their future service, and also to enable them to perform the scientific duties for which the Navy Department had been obliged to employ civilians. This proposition met with the hearty approval of the Secretary of the Smithsonian Institution, and six young officers in the Navy, who had shown special liking for scientific matters during their educational course, were detailed to the Museum. They were instructed in taxidermic work and became quite proficient in the preparation of skeletons and skins of birds and mammals. Several of them also familiarized themselves with photography. This experiment having proved satisfactory, twelve other junior officers were assigned to the Museum. During the last few years the Department has found it inconvenient to continue the arrangement. While its discontinuance is to be regretted, there is no doubt that important results will be gained, both by the Navy Department and the National Museum, from the scientific training which has been given to these officers.

Several collections have, indeed, been already obtained as a result of the arrangement. Messrs. Dresel and Ackerman, the two ensigns assigned to the Smithsonian Institution, who were detailed by the Secretary of the Navy to accompany the *Yantic* on her voyage to Lady Franklin Bay in search of the Greely party, secured very valuable representations of the ethnology and natural history of that region. These have been turned over to the Museum and incorporated in the collections. Ensign J. B. Bernadou, who was ordered to Corea in 1883 for the purpose of prosecuting explorations under the direction of the Smithsonian Institution, forwarded a large and valuable collection of ethnological and zoölogical specimens, many of which were entirely new to the Museum. An interesting series of ethnological and natural history objects has been received from Lieut. W. E. Safford. Lieut. A. P. Niblack, during a cruise upon the Alaskan coast in 1888, secured an extensive representation of the ethnology and zoölogy of that region, and obtained material for an elaborate report upon the coast Indians of Southern Alaska and Northern British Columbia, which was published in the Report of the National Museum for 1888.

When Commander F. M. Green was detailed to determine the longitudes of points in the Pacific Ocean, he invited the coöperation of the Smithsonian Institution in making his work productive in results in natural history as well as in physical science. Through his efforts a large amount of valuable material was secured, and the Government authorities at Tokio and the officers of the Natural History Museum at Shanghai were induced to contribute collections to the Museum.

In November, 1885, Lieut. T. Dix Bolles was detailed for service in the National Museum by the Secretary of the Navy, and was assigned to the department of ethnology. He rendered valuable service in the classification and arrangement of the Eskimo collections, which he completed in 1888, when, to the regret of the Museum, he was recalled by the Navy Department and assigned to active duty.

The Secretary of the Navy also rendered important service by detailing the U. S. S. *Mohican* to bring to the United States a collection of stone images and archæological objects from Easter Islands. Rear-Admiral Kimberly, of the Navy, forwarded a number of valuable ethnological specimens presented to the United States Government by Malietoa, Mataafa, and other Samoan chiefs.

The scientific work of the United States Naval Observatory has naturally brought about an affiliation with the Smithsonian Institution, and this coöperation has been effective in connection with the transmission of astronomical discoveries by telegraph. The Institution is indebted to the Superintendent of the Observatory for the receipt of telegraphic time at noon of each day, and a clock has been supplied, fitted up under the direction of the Observatory, by which the Observatory corrects aberrations in time.

Dr. James M. Flint and Dr. H. G. Beyer, of the Navy, have rendered

valuable assistance as honorary curators of the section of materia medica in the Museum.

DEPARTMENT OF THE INTERIOR.

The rapid growth of the museum collections in certain directions is due in a large degree to the addition of material turned over to it by the U. S. Geological Survey, after having served the purposes for which it was collected. This material is gathered by trained collectors sent out especially for the purpose, and has in most cases been carefully described and labeled before it reaches the Museum. Large quantities of rocks, minerals, ores, fossils, etc., have been forwarded annually by the Survey. The Museum is also indebted to the Survey for the valuable services rendered by the following gentlemen as members of the scientific staff: Dr. C. A. White, in charge of mesozoic fossils; Mr. Charles D. Walcott, in charge of paleozoic fossils; Mr. William H. Dall, in charge of mollusks and tertiary fossils, with Dr. R. E. C. Stearns as adjunct curator; Prof. O. C. Marsh, in charge of vertebrate fossils; Prof. Lester F. Ward, in charge of fossil plants, with Mr. F. H. Knowlton as assistant curator; and Prof. W. F. Clarke, in charge of minerals.

The Director of the Survey having organized a special department of maps and charts, the Smithsonian Institution offered the use of material comprising many thousands of sheets which had accumulated during forty years. This offer was accepted by Major Powell, with the understanding that the material would be properly classified and arranged, and remain at all time subject to the order of the Smithsonian Institution.

A great mass of material, embracing more particularly the building-stones, ores, combustibles, and forest timber of the United States, resulted from the industrial collections of the census of 1880. These collections represent complete series, as far as practicable, from all parts of the country, and are rendered especially valuable to the Museum by reason of the full and accurate descriptions which accompany the specimens. The collection of building and ornamental stones has been furnished in this way with thousands of specimens of marble, granite, sandstone, etc., and it is fair to assume that no established quarry in the United States is unrepresented. The collection of ores, which is also very extensive, contains representations from all the important mines of the country. The specimens are accompanied by authoritative reports upon their chemical and metallurgical properties, as well as upon their economic value.

In 1883 the collection of Washington relics was transferred from the Patent Office. It includes not only the old collection that had been on view for so many years, but also a large number of objects purchased some years ago by Congressional appropriation from Col. Lewis, and never unpacked after their arrival in the city. This collection is one of the most attractive to the visitors to the Museum. Through the cour-

tesy of the Commissioner of Patents specifications and patents illustrating the development of photography and the graphic arts in the United States and in Germany have been obtained.

Hon. N. H. R. Dawson, the Commissioner of Education, presented a series of very interesting publications relating to American educational history.

POST-OFFICE DEPARTMENT.

The Post-Office Department has contributed to the welfare of the Museum, although in a less degree than the others. In 1887 it presented to the Museum a collection of United States postage stamps, newspaper wrappers, stamped envelopes and newspaper stamps, numbering one hundred and seventy specimens. Through the courtesy of the Postmaster-General, the superintendent of the Dead-Letter Office has been instructed to inform the Museum of the receipt in his office of objects received which might be of value to the collections.

DEPARTMENT OF AGRICULTURE.

By far the largest part of the National Herbarium has been in the custody of the Department of Agriculture since 1869, when, at the request of the Secretary of the Smithsonian Institution, the Commissioner of Agriculture consented to house the material received either direct or through the Smithsonian Institution, and to permit the botanist of the Department to bestow as much time upon the collection as was necessary in order to keep it in a good state of preservation. The National Herbarium has for many years been under the charge of Dr. George Vasey, botanist of the Department of Agriculture. In later years the curator of fossil plants in the National Museum found it desirable to have available for his use, in comparing recent with fossil forms, a limited number of specimens within easy access, and in this way a second collection of recent plants has sprung up, both, however, forming parts of the National Herbarium, which will be transferred wholly to the care of the Museum, as soon as it shall be found practicable to provide proper accommodations for the collection. In 1886, Prof. C. V. Riley, entomologist of the Department, and honorary curator of the department of insects in the National Museum, gave his collection of North American insects, representing the results of his own labors for more than twenty-five years. This collection is by far the most important accession which the department of insects has ever received. The Museum is indebted to the Department of Agriculture for the volunteer services of the following-named gentlemen as honorary members of the scientific staff: Prof. C. V. Riley, in charge of the department of insects; Dr. B. E. Fernow, in charge of the section of forestry; Dr. George Vasey, in charge of the department of botany, and Prof. W. O. Atwater, in charge of the section of foods.

U. S. FISH COMMISSION.

Exceedingly important contributions have been received yearly from the U. S. Fish Commission. Large quantities of material, embracing fishes, mammals, reptiles, batrachians, insects, birds, birds' eggs, fossils, plants, and geological and archæological objects, have been transmitted to the Museum by the Commission, as the results of expeditions. Important contributions to our knowledge of the fauna of the West Indies have been made by the steamer *Albatross*. Searches made for new fishing grounds in the Gulf of Mexico and off the coast of Newfoundland and the adjoining region, abounded in results of great practical as well as scientific value. Explorations along the entire Atlantic coast of North America, from the Grand Bank of Newfoundland to the southern part of Florida and the Bahamas, produced results of biologic importance. Dr. Tarleton H. Bean explored the waters adjacent to Long Island, and succeeded in making some interesting scientific and practical discoveries. Mr. Charles H. Townsend made extensive explorations on the coast of California, and obtained valuable statistics in regard to the fisheries of the Pacific coast. He also visited Mount Shasta and carefully noted the distribution of animal life.

Through the courtesy of the Commissioner of Fisheries two employés of the Museum were permitted to accompany the schooner *Grampus* on its trip to the Gulf of St. Lawrence in 1887, for the purpose of investigating the natural history of that region, and especially of securing remains of the Great Auk. Success attended their efforts, and a large amount of material was secured.

The Museum is indebted to the Commission for the valuable services rendered by Mr. Richard Rathbun, as honorary curator of marine invertebrates; Dr. Tarleton H. Bean, as honorary curator of fishes, and Capt. J. W Collins, as honorary curator of fisheries and naval architecture.

K.—EXPLORATIONS.

The material which has been received by the National Museum during the year, as a result of the work of the various collectors, who were either commissioned by the Museum to gather specimens or who offered their services, has greatly enriched the collections.

Through the courtesy of the Secretary of the Treasury, who commissioned Mr. Henry W. Elliott, of the Smithsonian Institute, to visit Alaska in the interest of the seal fisheries, a taxidermist of the Museum was allowed to accompany Mr. Elliott, Mr. William Palmer being selected for that duty. The results of this trip were highly gratifying, and valuable assistance was rendered by Capt. W. C. Coulson, of the U. S. Revenue Marine steamer *Rush*. The collections included a fine specimen of walrus, the first obtained by the Smithsonian Institution from Walrus Island since 1857. This was transmitted by Capt. Coul-

son. Collections of birds, birds' eggs and skeletons, mammals, plants, insects, crustaceans, shells, fossils, and fishes were also made.

Mr. W. W. Rockhill, whose past services in Thibet have resulted so favorably in behalf of the Museum, contemplates another journey to that region. Mr. Rockhill, in a letter dated June 3, writes as follows:

In compliance with your request that I would outline to you my proposed plan of exploration in Thibet, I have much pleasure in submitting the following brief outline of the work I am anxious to undertake.

Returning to the Koko-nor by the route I formerly followed (*i. e.*, Peking, Hsi-an-fu, Lan-chou-fu, Hsining) I would endeavor to go round Lake Koko-nor by the south and thus complete my study of the eastern Thibetan tribes. After that, the Te'aidam Mongols, with whom I spent two months and over in 1889, would require to be studied more fully as to their social relations and language.

After this preliminary part of the journey I would go to a Thibetan tribe three days' march south of the source of the Yellow River, and claim the services promised to me to travel towards Lh'ara on my former journey. Should I not be able to thus reach that city, I have marked on the sketch maps I send herewith, two other routes, either of which I could follow with great profit to my special studies, and neither one of which presents insurmountable difficulties. Any one of the routes I propose following in Thibet will lead me through inhabited regions of special interest to ethnography. The degree of culture of the tribes inhabiting them is lower than in any other region of the country, save perhaps that between India and Thibet, but these tribes are probably not of the pure Thibetan stock.

Mr. Rockhill has continued his interest in making collections for the Museum. Among the contributions received from him is a map of Peking; a specimen of popular Chinese cartography, Chinese Buddhist book containing the Thibetan gospels, a fine collection of Chinese cloisonnés, enamels, lacquers, and bronzes, daggers and other weapons (deposited), and many ethnological objects relating to Chinese modes of living.

Dr. W. L. Abbott, of Philadelphia, Pa., has supplemented his previous collections by contributions of valuable material gathered in different parts of Africa, including a magnificent collection of weapons and personal ornaments of the Wa Chaga and Waisi negroes of the Kilima-Njaro region,* ethnological specimens from the Chagga tribes in the same locality, mammal skins and skulls, insects, specimens of woods, plants, fishes, crustaceans, birds, birds' eggs, birds' skeletons, fossils, and reptiles and batrachians, photographs taken in East Africa showing natives, scenery, habitations, and objects belonging to native life, from Madagascar, Kilima-Njaro and the Seychelles Islands.

Mr. Héli Chatelain, of Vineland, N. J., has collected, during his travels in Africa, a great variety of interesting objects. On his return to the United States last year, he added many valuable objects to the Museum collection. Among these may be mentioned a Sechuana Bible (Pentateuch) used by Dr. David Livingstone in his journey from the Cape of Good Hope to Loanda, West Africa. This book has Dr. Livingstone's autograph on the first page. The most extensive explora-

* A catalogue of this collection is published in Section III of this volume.

tions of Mr. Chatelain have been in western Africa, and from that region the Museum has received from him mammals, ethnological objects, coins, textiles and foods, rocks, shells, fossils, insects, marine objects, reptiles, birds' nests, a specimen of hair taken from the head of a McBamba negro, and many articles used in the daily life of the natives.

Capt. Frank Curling, of the *Joseph S. Spinney*, in a recent voyage, found a dugout adrift about 210 miles off the Pelew or Paloa Islands in the western Pacific Ocean. The boat contained 7 men, who had started from the Pelew Islands on a fishing cruise. They were overtaken by a storm and drifted out to sea, and were rescued by Capt. Curling. The dugout was forwarded to the Museum by Capt. S. A. Day, U. S. Army, Fort Mason, San Francisco, Cal., and attracts much attention.

Mr. R. M. Bartleman, of the United States Legation at Carácas, Venezuela, has continued his interest in the Museum. He has transmitted, as the results of his explorations, through Prof. O. T. Mason, some very interesting and valuable objects, among which are specimens of pottery from the Island of Gran Roque, stone implements, insects, shells, specimens of salt from the Salt Lakes of Cumana, a snake, gourds, and Cicadæ, used for medicinal purposes.

Mr. J. P. Iddings, of the U. S. Geological Survey, collected for the Museum on the island of Lipari, Mediterranean Sea, a volcanic bomb, and a specimen of basalt with inclusion of vitrified sandstone, found after the Etna eruption of 1886.

Mr. I. C. Russell, of the U. S. Geological Survey, has added to the collection, as a result of his recent explorations, faulted pebbles from Pinnacle Pass, Mt. St. Elias, Alaska; specimens of iron ore from Michigan and Alabama, coal from Vancouver Island, and ethnological objects from Alaska.

Lieut. Charles F. Pond, U. S. Navy, during his travels in Guatemala, collected and sent to the Museum specimens of grasshoppers and fireflies.

Mr. P. L. Jouy, of the Museum staff, while on an exploring trip in Arizona, collected for the Museum many valuable specimens of natural history. Mr. Jouy is now in Mexico engaged in similar work.

The U. S. Fish Commission contributed to the Museum several new and valuable collections of fishes gathered by the steamer *Albatross* on the Pacific and by the schooner *Grampus* on the Atlantic coast.

Mr. Barton A. Bean, of the Museum staff, made a brief trip to Cape St. Charles, Virginia, for the purpose of collecting the fishes of that locality. He succeeded in obtaining several interesting specimens.

Rev. A. C. Goode, now traveling in Africa, has signified his intention to aid the Museum in the collection of ethnological material.

Hon. J. M. Crawford, consul-general at St. Petersburg, Russia, has

continued his work of collecting ethnological objects for the Museum. Writing under date of January 13, 1891, he says:

"I am getting on very nicely with the Finnish collection. In June I was all through Finland, and I even began the Arctic Circle in the Frigid Zone. I gathered considerable material, including curious old musical instruments, sacred Cantela, harp, weighing implements, hand-mill, bronze instruments, stone axes, copper plates (used for money), ancient jewelry, and an ancient Karelian costume of a peasant girl. Next summer I will make my shipment to the Smithsonian Institution."

COLLECTORS' OUTFITS.

During the fiscal year ending June 30, 1891, the following collecting outfits have been furnished by the Museum:

1890.

September 1.—Col. Cecil Clay, of the Department of Justice, obtained permission from the Commissioner of Crown Lands, Quebec Province, Canada, to procure specimens of moose and caribou for the National Museum. Col. Clay was supplied with a suitable outfit for this purpose.

November 12.—Mr. P. L. Jouy started on an exploring expedition in Arizona for the purpose of procuring natural history specimens for the Museum. He was supplied with a large outfit, including tanks, alcohol, jars, cloth, cans, ammunition, etc., to be used in collecting and preserving the specimens. The collections received from him are referred to in the accession list (Section v).

November 15.—Mr. R. M. Bartleman, of the United States Legation at Carácas, Venezuela, was supplied with an outfit, including a tank-box, alcoholic jars, etc. Several collections have been received from Mr. Bartleman, and reference is made to them in the accession list (Section v).

December 1.—Mr. H. W. Perry, of Chicago, Ill., was supplied with a quantity of ammunition, several tank boxes, and other material necessary for collecting specimens in Honduras.

1891.

Photographic outfits were lent to several Army and Navy officers, who were detailed for duty in foreign countries in connection with the World's Columbian Exposition. Among these were:

January 7.—Dalmeyer lens sent to Lieut. Baker, care of United States legation, Mexico City.

January 29.—Camera and film sent to Lieut. E. E. Sawyer, U. S. Navy.

Camera and film sent to Mr. W. P. Tisdell.

Camera and film sent to Lieut. George P. Scriven, U. S. Army.

April 10.—Dr. R. W. Shufeldt, U. S. Army, Takoma Park, D. C., was supplied with alcohol, tank-box, and other articles necessary to be used in collecting natural history specimens for the National Museum. Reference to his collections is made in the accession list (Section v).

May 11.—Mr. C. K. Worthen, of Warsaw, Ill., was furnished with material to be used in making a collection of bats and shrews for the National Museum.

Mr. A. G. Menocal, chief engineer of the Nicaraguan Canal Construction Company, at San Juan Del Norte, Nicaragua, has kindly consented to aid the Museum in its endeavor to secure collections of natural history from that country, and to enlist the aid of his assistants in this connection.

SECTION II.

REPORTS OF THE CURATORS OF THE U. S. NATIONAL MUSEUM UPON THE PROGRESS OF WORK DURING THE FISCAL YEAR ENDING JUNE 30, 1891.

REPORT ON THE DEPARTMENT OF ETHNOLOGY IN THE U. S. NATIONAL MUSEUM, 1891.

By Otis T. Mason, *Curator*.

The policy adopted in the formation of this department, to make all its operations contributory to the instruction of the people and to the advancement of anthropological science, has been steadily pursued. In addition to the routine work of receiving additions to the collections and caring for them, some important results have been accomplished, which will be referred to in detail.

In August, 1890, the curator, in company with Mr. True and Dr. Stejneger, commenced the preparation of a set of standard maps to be used in labeling the case and specimens in the National Museum. The work of this committee is now completed. It will add very much to the efficiency of our method of installation to have the geographical distribution of specimens indicated. In the Dresden Museum each specimen or special group is accompanied with a map indicating the area over which the species to which it belongs is spread.

The curator attended a meeting of the American Association for the Advancement of Science in August, and utilized this opportunity to interest those connected with museums and institutions in the States in the methods of the National Museum, and to establish a friendly relationship between these institutions and our own. The policy of doing every thing to encourage the formation of local societies for the purpose of carefully working up the archæology and natural history of small sections, has been a very efficient means of enlarging the national collections.

In September, 1890, the President of the United States created a National Board on Geographical Names. This Board consists of representatives from the several map-drawing departments of the Government. The Secretary of the Smithsonian Institution was requested to appoint one from his staff to act in behalf of this Institution, and the writer was invited by him to accept this position. The Board has held monthly and special meetings, and many hundreds of names printed in different spellings on the charts of the Hydrographic Office, the Coast Survey, the Geological Survey, the Department of State, the Light-

House Board, the Land Office, the Post-Office Department, the Census maps, etc., have been carefully studied and a uniform spelling adopted. Two bulletins have been published by the Board, and others will be ready for the printer by the end of the fiscal year.

The curator has been called upon frequently in this geographic work to settle the spelling of aboriginal names, and this has necessitated a great deal of research.

In September, 1890, a fresh start was made in the preparation of life-size lay-figures of aboriginal people. Fortunately, Mr. Héli Chatelain brought with him from Angola a native, named Jeremiah, of whom Mr. Mills has made an excellent reproduction for the ethnic series. Arrangements have been made to follow up this work of making lay-figures to illustrate all the stocks of North American aborigines.

In October the department was fortunate enough to again secure the services of Lieut. T. Dix Bolles, U. S. Navy, who devoted several months to the arrangement and cataloguing of specimens in our possession from Oceanica. This he has worked up with assiduous care, and too much praise can not be accorded to the Secretary of the Navy for the continued exhibition of his interest in our work, in thus assigning Lieut. Bolles and other efficient officers to duty in this Institution. A great deal of this material which Lieut. Bolles has set up had been stored away for years, awaiting examination by some one familiar with Polynesian studies. Valuable additions to the collections from Oceanica were sent by Admiral Kimberly and Lieut. Safford, U. S. Navy, and the latter showed his continued interest in the Museum by spending some time in giving information concerning the Samoan collection.

In November the curator delivered an address before the Folk-Lore Congress in New York upon the scientific treatment of this subject, taking the ground that we have in the survivals of custom, language, and belief a species of archæology, in which is contained a record of human history not to be found in printed page or in material relics, but in the conduct and belief of the unlettered folk. A systematic effort will be made to give dignity and effect to this study by more careful collecting and by the comparison of larger bodies of material.

In December the Latin-American department of the World's Fair, under Mr. William E. Curtis, secured the coöperation of several officers of the Army and Navy as commissioners to Central and South American Republics, to awaken an interest in, and secure material for, the World's Fair at Chicago. These gentlemen spent several weeks in the Museum taking lessons in photography, taxidermy, making squeezes, and practising other operations necessary to perfect them in their work. Before the end of the fiscal year favorable reports were received from these officers.

In January was completed a card catalogue of the large collections of religious objects secured among the pueblos of the southwest, by the Bureau of Ethnology. These specimens have been in the Museum for

six or seven years, but it was impossible to study them or put them on exhibition for want of information. This was kindly supplied by Mrs. Matilda Stevenson, who spent several days in the Museum and, with the help of a stenographer, supplied a legend for each one of the specimens. With this added information, the collection becomes the largest and best in the world on the subject of Pueblo religion.

On the 10th of April, 1891, was celebrated the beginning of the second century of American patents. The curator was appointed to prepare and read an essay on this occasion, and he was induced to comply with this request, in the hope that a large number of those who attended the Congress might have their interest aroused in the Museum. The result was far greater than he anticipated. Col. Dodge's collection of breech-loading firearms; Dr. Maynard's series, showing the unfolding of a single invention—the Maynard rifle; and Gen. Berdan's collection, have all been added to the National Museum, besides others which will be mentioned in the report of Mr. J. E. Watkins. The permanent organization of the Patent Association secures to the Museum a body of new friends.

In May the curator delivered a course of lectures in the Crozier Theological Seminary, Pennsylvania, on the Natural History of Religions. The object of these lectures was to show that religion may be brought within the purview of science as a body of phenomena. From the point of view of the Museum, religion is what men believe concerning a spirit world, and all that they do in consequence of such belief. That which they believe is creed, that which they do is cult. The science of religion is the comparative study of the creeds and the cults of the world.

Much time has been spent during the past year in working up a series of bows and arrows and shields and other objects connected with the art of war, or what the older writers call the "artillery" of the American aborigines. The material in the Museum to illustrate this subject is now very rich. The linguistic stocks of our American aborigines have been fully studied out, and the locations of each tribe when first mentioned by travelers and explorers, marked upon a map. By collecting the weapons of war of each tribe and studying their characteristics minutely, it is possible now to formulate a geography of them. This study has begun to bear fruit in two directions: Poorly labeled specimens which have been in the Museum a long time, and therefore extremely valuable, can be relegated to their proper tribe, and collections belonging to other bureaus for which no data have been furnished can be easily labeled by reference to our large series.

At the suggestion of Prof. Langley, Secretary of the Smithsonian Institution, and greatly aided by materials which he was able to secure in his travels abroad, the curator has commenced an exhibition series of time-keeping apparatus, beginning with the earliest known process of mechanically marking divisions of the day or small periods of time, and

ending with the most delicate chronograph. This is associated with the unfolding of all primitive engineering devices and of instruments of precision.

Much time has been spent during the year in forming a card catalogue of the ethnological series, a thing which has not been attempted before. This will enable future curators of the Department of Ethnology to put their hands at once upon all that is known concerning each specimen. It will also give additional value to all objects sent out for exchange.

Mr. A. Zeno Shindler has completed a series of type portraits of mankind, thirty-three in number. These have been prepared with great care, each figure painted half the natural size, as given in Topinard's tables. The color and costumes also have been carefully scrutinized by those who are personally familar with each type. As an educational series, these portraits are very instructive and give correct ideas to thousands of persons who can never hope to see the originals.

During the year my assistant, Mr. Walter Hough, has followed up the publication of his pamphlet on fire-making with an exhibition of all the types of this art, set up in such a manner as to show the spread of each type and the method of its elaboration, from the most simple process known. As a study in comparative technology and the geographic distribution of an art, this study is of great value.

As an encouragement to those who have given large collections to the Institution, the curator, assisted by Mr. Hough, has begun the preparation of monographic catalogues after the manner of the Kensington series. Frequently those who have been among our greatest benefactors are so much engaged that they have no time to prepare extended accounts of these donations, so the material slips into the great mass unnoticed. The effect of such seeming neglect is prejudicial to the best interests of the Museum, hence it is proposed to have the cataloguing done by the force in the department, especially of such material as the Bernadou and Allen collection from Korea, the Rockhill collections from Thibet, the collections of the Navy Department from Samoa, the collections of Dr. W. L. Abbott from Kilima-Njaro.

The department has had friendly connections with the British Museum, the Oxford Museum, the Royal Museum at Dresden, Dartmouth College Museum, and the Cincinnati Art Museum, through exchanges. A series of continuous small exchanges is found to be productive of the best results.

Mr. Héli Chatelain, who was for some years a missionary in Africa, and who acted as interpreter to the Eclipse Expedition in 1889, has rendered signal service to the Museum, not only by means of his collections, but in furnishing correct and ample information concerning each specimen collected and also concerning many hundreds of specimens already in the Museum from East Africa, of which little was hitherto known. On his return to Africa in June, Mr. Chatelain was furnished with an outfit for photographing and collecting.

During the last few weeks of the fiscal year the curator has given much time and attention to preparing for the Chicago Exposition. A plan proposed is as follows:

To show at Chicago, as accurately as possible, the aboriginal life of North America at the time the natives were first visited by the whites and before they were changed by contact with our civilization. Such an exhibit has never been attempted for any continent before, because the means were not at hand to carry it out. It is true that in all the great expositions much attention has been paid to primitive arts. The Paris Exposition of 1889 had a section devoted to the French colonies in Africa and in southeastern Asia, and there was a most interesting series of structures illustrative of human habitations in all grades of culture. In the Palais des Industries Diverses, fourteen groups of lay-figures were arranged to illustrate the progress of art, commencing with the rude cave-dweller and ending with the Chinese cloissonné worker. In many of the exhibits sent by our Institution to Philadelphia, London, Berlin, New Orleans, and Cincinnati, single arts or a single people have been exhaustively treated. At Philadelphia, under the direction of my distinguished predecessor, Prof. Charles Rau, assisted by Mr. Frank Cushing, the archæology of America was well set forth with attractive collections from the northwest coast. All these efforts were successful in their way, and it is now designed to follow them up with a comprehensive display which will enable the spectator to see the continent as it appeared to the first explorers. At the same time the exposition will furnish an appropriate culmination of a series of investigations which have been prosecuted for a century. Not that these investigations were pursued for the purpose of bringing them together in an encyclopædic work or display, but the World's Exposition furnishes the happy occasion of crowning the distinguished scholars who have for a hundred years been doing their best to make a great historic and ethnographic exhibit possible.

During the year the material gathered from various parts of the earth, without reference to the elucidation of any especial art, have been collected and arranged in a series of courts after the manner of the European museums. This has been only partially carried out on account of the great lack of space.

At the close of the year 1890–'91 the department became so crowded for space, that it was deemed necessary to entirely reconstruct the system of caring for the material, but this will furnish only temporary relief. Any one visiting the halls and space allotted to this department will see how entirely inadequate is the room, either for exhibition, storage, or for the study series. It is now necessary to box up a great many things, so that the curator can have no access to them without the greatest difficulty.

I beg that this matter be taken into consideration at the earliest moment, as it will soon be impossible to do anything but receive and

put away. This is not only very discouraging to the curator, but equally so to those who may wish to enrich our collections.

ACCESSIONS TO THE DEPARTMENT OF ETHNOLOGY DURING THE YEAR.

Greenland.—Dr. C. H. Merriam, man's suit (3 pieces); woman's suit (3 pieces); woman's summer suit (6 pieces); coat (3); trowsers (1 pair); boots (4 pairs); sleeping bag. (Acc. 23828.)

Labrador.—Miss Anna L. Ward, pouches (2); coiled basket tray. (Acc. 24381, 24511.)

Nova Scotia.—Capt. John G. Bourke, U. S. Army, birch bark canoe. (Acc. 24142.)

Canada.—Lady Edith Blake, sketches of bone ornaments from a Beothuc grave; sketches of emblems of Red Indian mythology. (Acc. 23591). Dr. C. H. Merriam; sealskin pouches (2). (Acc. 23828.)

Yakutat Bay, Alaska.—Dr. I. C. Russell, leather pouch and fish charm. (Acc. 23735.)

Eskimo.—Edward Lovett, whalebone nooses. (Acc. 23784.)

Washington.—Dr. Franz Boas, baskets (4); salmon spear; adze; hammer. (Acc. 23490.)

Oregon.—Dr. Franz Boas, baskets (3). (Acc. 23490.)

Hupa Indians, California.—Lieut. Robert H. Fletcher, U. S. Army, gaming sticks (1 set); photograph of "White Deer Dance;" dance wand; arrows (2). (Acc. 23829, 24368.)

Bannock Indians, Idaho.—Capt. John G. Bourke, U. S. Army, doll cradle; beaded bag; beaded leggings (1 pair). (Acc. 24142.)

Nez Perce Indians, Idaho.—Prof. C. H. Hitchcock, Chief Joseph's suit.

Crows, Montana.—Capt. John G. Bourke, U. S. Army, whetstone; whip. (Acc. 24142.)

Piegan Indians, Montana.—Dr. C. Hart Merriam, bead-work. (Acc. 23828.)

Leadville, Mont.—Lewis Engel, miner's candle holder. (Acc. 24128.)

Sioux Indians, Dakota.—Mrs. E. J. Stone, child's moccasins (1 pair). (Acc. 23319.) Dr. Z. T. Daniel, tweezers; carved pipestone; wooden pipe; buffalo horns (2 pairs); tobacco pouch; antelope bones, showing method of extracting marrow; gun lever, Custer's battle; photos (2). (Acc. 23489, 23675, 24013, 24244, 24526.) Capt. John G. Bourke, U. S. Army, war club; herald's wand; medicine man's shirt; baldric; tobacco bags (2); pipes (2); toy moccasins (1 pair). (Acc. 24113, 24132.) A. J. Standing, pipe and pipe pouch. (Acc. 23370.) Lewis Engel, photograph of seven chiefs. (Acc. 24548.) Emil Granier, suit of clothing. (Acc. 24505.) Nathan Appleton, photographs of Sioux Indians (3). (Acc. 24212.) Charles L. Bristol, catlinite pipe with stem. (Acc. 23544.) Maj. J. H. Wilcox, U. S. Army, bow. (Acc. 23560.) F. O. Lewis, ghost shirts (2). (Acc. 24204.) Max. E. Dickerson, photograph of Sitting Bull's war club. (Acc. 23721.)

Arikarees, South Dakota.—Dr. Z. T. Daniel, arrow heads (2). (Acc. 23489.)

Assiniboine Indians.—A. J. Standing, squaw belts (3). (Acc. 23370.)

Shoshone Indians, Wyoming.—Capt. John G. Bourke, U. S. Army, pipe and stems (2); war bonnet. (Acc. 24142.) Lewis Engel, buffalo calf skin. (Acc. 24548.)

Winnebagos, Nebraska.—Capt. John G. Bourke, U. S. Army, doll. (Acc. 24142.)

Cheyennes, Indian Territory.—Capt. John G. Bourke, U. S. Army, knife case; beaded box; moccasins; shield; ring; elk teeth (2); pipe; necklace. (Acc. 24142.) A. J. Standing, head-dress. (Acc. 23370.) Dr. Z. T. Daniel, burial relics. (Acc. 24013.)

Arrapahoes, Indian Territory.—Capt. John G. Bourke, U. S. Army, pipe; gun case; moccasins (1 pair); purse. (Acc. 24142.)

Ute Indians, Utah.—Lewis Engel, squaw saddle; apron; moccasins (1 pair); pappoose board; photographs (52). (Acc. 24548.)

Salt Lake City, Utah.—Lewis Engel, "Temple" silk handkerchiefs; book of Mormon; Mormon photographs (107); cowboy photographs (80); cowboy coats (2);

trowsers, leggings, blankets (2); buffalo robe, hunting pouch, moccasins (6); belts (2), and whip; photographs of Rocky Mountain scenery (93.) (Acc. 24128, 24548.) George W. Woltz, fig leaf apron worn by elders; moccasins worn by elders. (Acc. 23481.)

Piutes, Nevada.—Capt. John G. Bourke, U. S. Army, cooking tray. (Acc. 24142.)

Navajos, Arizona.—Dr. Washington Matthews, U. S. Army, cactus tongs. (Acc. 23625.) Lieut. R. W. Shufeldt, U. S. Army, photographs of belt weaver (2). (Acc. 24339.) Capt. John G. Bourke, U. S. Army, loom and rug; hair rope; neck ornament; turquoise (6 pieces); silver buttons (10); pump drill. (Acc. 24142.)

Pimas, Arizona.—Capt. John G. Bourke, U. S. Army, whip. (Acc. 24142.)

Papagos, Arizona.—Capt. John G. Bourke, U. S. Army, halter. (Acc. 24142.)

Wolpi Pueblos, Arizona.—Capt. John G. Bourke, U. S. Army, tobacco bag. (Acc. 24142.)

Moki Pueblos, Arizona.—Jeremiah Sullivan, sacred pine shoots. (Acc. 11175.) Capt. John G. Bourke, U. S. Army, medicine rattles (2); shrine offerings (2); ancient pottery (8 pieces); household gods (5); ladle; toy baskets (2); rattles (2); ornaments (16); basket tray; woman's girdle; girdle; head ornament; head dress; baskets (10); rabbit clubs (2); pipes (4); bone flaker; medicine drum. (Acc. 24142.)

Apaches, Arizona.—Capt. John G. Bourke, U. S. Army, twirling sticks (2); tobacco bags (2); medicine cord; buckskin coat; moccasins (3 pairs); canteen; arrow points; agency tag; louse catcher; basket tray; mystery flute; brush; toy baskets (3); basket; war club; sacred meal; medicine arrows (2); playing cards; awl case; head dresses (4); fiddle; doll babies (4); bows (3); arrows (9); game; head ornament; talisman; sacred meal bag; scratch stick and drinking reed; medicine cords (3); war bonnet; medicine shirts (3). (Acc. 24142.) Lewis Engel, beaded medicine bags. (Acc. 24548.) H. H. Rusby, photographs of ruined pueblos (28). (Acc. 13809.)

Yumas, Arizona.—Capt. John G. Bourke, U. S. Army, rattle. (Acc. 24142.)

Mojaves, Arizona.—G. A. Allen, paint bag; head dress; pottery dolls (2); cradle; mesquite beans; screw beans; hair of Mojave; photographs (4). (Acc. 24160.)

Lipans, Texas.—Capt. John G. Bourke, U. S. Army, carrying pouch; Fort Ringgold, mesquite beans. (Acc. 24142.)

Aesaupais, Grand Cañon of the Colorado.—Capt. John G. Bourke, U. S. Army, ladle; basket; fire tongs. (Acc. 24142.)

Trinidad, Colo.—Elborn F. Ward, French potter's lamp. (Acc. 23657.)

Zuñi, New Mexico.—Capt. J. G. Bourke, U. S. Army, fetiches (6); girdle; spoon; blocks for kicking game (3); top; hammer; medicine cord; necklace. (Acc. 24142.)

Picuris, New Mexico.—Capt. John G. Bourke, U. S. Army, bears' claw necklace. (Acc. 24142.)

Isleta, New Mexico.—Capt. John G. Bourke, U. S. Army, shield. (Acc. 24142.)

Acoma, New Mexico.—Capt. John G. Bourke, U. S. Army, drum. (Acc. 24142.)

Nambe, New Mexico.—Capt. John G. Bourke, U. S. Army, altar pieces. (Acc. 24142.)

Sia, New Mexico.—Miss May Clark, fetich, "mole." (Acc. 24577.)

Taos, New Mexico.—Capt. John G. Bourke, U. S. Army, crosses (2). (Acc. 24142.)

Rio Grande Pueblos.—Capt. John G. Bourke, U. S. Army, pipes (2); pottery (40 pieces); tops (2); bowl. (Acc. 24142.)

Hidalgo, Mexico.—Capt. J. G. Bourke, U. S. Army, sling. (Acc. 24142.)

Mexico.—Edward Lovett, reticule. (Acc. 24343.)

Menomonee Indians, Keshena, Wisconsin.—Model of grave; sketch of grave of Oshkosh; sketch of Grand Medicine Lodge. (Acc. 23794.)

Massachusetts.—Essex Institute, Salem, Mass., photograph of original box of Lucifer matches (Acc. 23981). M. F. Savage, weaver's lamp; water heater; fat lamps (2); (Acc. 23640). Dr. C. A. Norton, warming pan; photograph of fireplace in Franklin's homestead; photograph of Whittier's fireplace. (Acc. 22641.)

Providence, R. I.—M. F. Savage, pewter night lamp. (Acc. 23640.)

New York.—Mrs. F. M. Hartwell, foot-stove (Acc. 24390). Moses Eames, wooden

plow of 1820 (Acc. 23969). Syracuse Plow Company, model of steel plow (Acc. 24060). Rufus A. Grider, water-color sketches of famous powder horns (130) (Acc. 24045). J. E. Ireland, mouse trap (Acc. 24186). Nathan Appleton, photographs of ship bearing Statue of Liberty (2) (Acc. 24212). Bürgi Brothers, relief map of Palestine (Acc. 24475). Mrs. E. J. Stone, moccasins of Oneidas (2 pairs). (Acc. 23319.)

Pennsylvania.—Stewart Culin, playing cards (2 packs) (Acc. 24402). T. W. Sweeney, fire-place lamps (2); fat lamp and candlestick. (Acc. 23525.)

Virginia.—E. E. Mason, pot hook from Custis mansion (Acc. 23861). Capt. John G. Bourke, U. S. Army, saber. (Acc. 24142.)

District of Columbia.—Col. W. C. Dodge, English cross bow, belts, helmet, revolvers, (6); extractors (2); repeating pistol, Austrian breechloaders, arquebus, matchlock, breechloaders (16); magazine guns (5); German wheel lock, German needle gun, Martini-Henry rifle, French chassepot, United States military rifle, German wheel carbine, rebounding gun lock, pistol, volcanic repeating arm, powder flask, test of Simond's steel bullets (Acc. 24171). Thomas Dowling, jr., swords (3), fireman's trumpet (Acc. 23809). Geo. W. Woltz, extinguisher (Acc. 24226). Gen. C. H. Berdan, Berdan rifle and metallic cartridge (Acc. 24188). Emile Granier, lithographs (Acc. 23944). Mrs. E. J. Stone, headwork (6 pieces), lace pillows (2) (Acc. 23319). William Churchill, mounts showing method of tying square knots (Acc. 23676). J. Louis Willige, pistol. (Acc. 24106.)

West Virginia.—Walter Hough, lamp-wick trimmers (Acc. 23346). O. T. Mason, leather-finishing tool. (Acc. 23405.)

Ohio.—Prof. F. W. Putnam, fat lamp. (Acc. 23645.)

Indiana.—Henry F. Blount, model of modern plow. (Acc. 23873.)

Cherokees, North Carolina.—James Mooney, ball rackets (1 pair), (Acc. 23764). Capt. John G. Bourke, U. S. Army, pipes (2); spoon; blowpipe gun. Acc. 24142.)

Negroes, North Carolina.—J. E. Benedict, basket. (Acc. 24238.)

Florida.—Mrs. E. J. Stone, rule of cabrasa wood. (Acc. 23319.)

Barbadoes.—Rev. F. Gardiner, jr., basket. (Acc. 22998.)

St. Vincent, Barbadoes.—W. E. Curtis, photograph of Carib relics. (Acc. 24379.)

Cuba.—W. C. Winlock, fireflies. (Acc. 23611.)

Colombia.—Charles Bullman, bark cloth; paint pot. (Acc. 23612.)

Venezuela.—R. M. Bartleman, jicaras. (Acc. 24216.)

Peru.—F. T. Redwood, Peruvian image. (Acc. 23611.)

Amazon River, South America.—J. O. Kerbey, bark paper (Acc. 24193). F. G. Fry, masks (9); gourd vessel; ornament; necklace; rattle; girdle; cloth; carrying-nets (2). (Acc. 22738.)

England.—Edward Lovett, tinder pistol; snuffers and tray; matchlock gun; ancient knife; King Alfred candles (2); pistols (2), (Acc. 23416, 23950, 24342). Henry Balfour, bakers' lamps (2); sections of compound bows (4). (Acc. 24290.)

Orkney and Shetland Islands.—Henry Balfour, shell lamp (model). (Acc. 23783.)

France.—A. Zeno Shindler, strike-a-light (Acc. 23977). Edward Lovett, shell snuff box; sulphur matches. (Acc. 23416.)

Normandy.—Henry Balfour, cruise lamp. (Acc. 23783.)

Brittany.—Henry Balfour, shell spoon; shell lamp (model). (Acc. 23783, 24290.)

Germany.—Bene Bache, beer mug. (Acc. 23973.)

Switzerland.—W. W. Rockhill, wooden clogs (Acc. 23372). Edward Lovett, fire drill (Acc. 23950). Mrs. E. J. Stone, paper-knife. (Acc. 23319.)

Denmark.—Dr. C. A. Norton, fire-carrying tongs. (Acc. 23798.)

Spain.—Prof. S. P. Langley, monte cards (Acc. 24281). W. W. Rockhill, clasp-knife (Acc. 23372). Col. F. A. Seely, ethnological photographs (27). (Acc. 23709.)

Syria.—Stewart Culin, playing cards (2 packs). (Acc. 24402.)

Asia Minor.—Col. F. H. Tappan, chain shirt. (Acc. 23839.)

Bagdad, Turkey.—Department of State, inscribed bricks (2), (Acc. 24201). Rev. J. P. Peters, oven; clubs (2); lock and key; coffee mortar; bird trap; gun trappings (3); drum; pipes (3); food mat; man's costume (8 pieces); woman's costume (8

pieces); millstones; coffee pots (5); pistols (3); coffee roaster; cups (6); spear head; pitcher; boat; plow; yoke; spade; guns (2); flint and steel; tobacco pouch; kohl paint; anklets; nose-ring; necklace. (Acc. 24087, 23986.)

India.—Dr. W. H. Dall, turban (Acc. 24401). Rev. John P. Newman, mosaic dish from Agra (Acc. 23785). Edward Lovett, hand-fans (2); hookah; image of Buddha. (Acc. 23416.)

Ceylon.—Edward Lovett, carved wooden spoons (4). (Acc. 23416.)

Spain.—L. H. Boyd, playing cards (5 packs); gaming dice (1 set). (Acc. 24478.)

Burmah.—The Museum, Oxford, England, blow gun (Acc. 24291). Edward Lovett, drinking cup. (Acc. 23950.)

Egypt.—Edward Lovett, writing case. (Acc. 24343.)

Algiers.—W. W. Rockhill, spurs (Acc. 23592). Edward Lovett, snuff-box; earthen lamp; moorish lamp. (Acc. 23416.)

Tunis.—Edward Lovett, dagger (Acc. 23950). Mrs. E. S. Brinton, pottery lamp. (Acc. 24064.)

Tangier.—Edward Lovett, pipes (4). (Acc. 23950.)

Oran.—W. W. Rockhill, daggers (4); sword. (Acc. 23372.)

Kaffirs, South Africa.—British Museum; wooden spoons (6); gourds (2); necklace (6); leglet; hat; bracelets (4); knapsack; breast plate; staff; assagais (2); head plume (Acc. 23892); Foster, photographs of Zulus (43), (Acc. 23602); W. E. Frye, gourd whistle. (Acc. 23670.)

Hottentots, South Africa.—Prince Roland Bonaparte; photographs of Hottentots (14). (Acc. 24177.)

Wa Chaga Negroes, Mt. Kilima-Njaro, East Africa.—Dr. W. L. Abbott; photographic negatives (41); swords (16); knives (8); bows (5); shield (1); assagais (16); ear stretchers (4); ear plugs (2); aprons (8); snuff horns (3); beadwork; plumes (3); medicine girdle; bags (5); daggers (3); razors (3); manioc knife; bird arrows (5); quiver and arrows (16); knob sticks (4); wooden dishes (18); etched gourd; spoons (5); honey bucket; headdresses (3); war capes (5); sleeping mat; basket trays (4); wallets (2); dippers (4); shields (11); beaded belts (5); neck rings (13); armlets (12); anklets (5); finger rings (2); necklaces (4); wristlets; ankle rattles (2); arm rings (3); earrings (10); ear ornament; beer tubs (3); beehives (3); mortars (2); combs (3); churn-dashers; war cloth; fire-sticks (2); stool; hoes (4); axes (2); war-capes (2); jar; mallet; partridge trap; awls (3); snuff-bottles (3); rat-trap; bracelets (4 pairs); fig-leaf (2); tweezers; knife-gouge; beer-cup; goat-cage; food hook; granary (2); wicker door; goat-trough; reaping-knife; reaping-hook; native huts (models, 3); game-board; cup; feather case; quivers (4); arrows (27); stool; cooking-pot; dress; face ruffs (2); hair ornaments (2); rattles (4); cow-bells (2); bucket; dress for boy and girl; cloaks (2); capes (2). (Acc. 23158, 23656, 24008, 24334.)

Somalis, East Africa.—Prince Roland Bonaparte, photographs of Somalis (50). (Acc. 24177.)

Africa.—Rev. F. Gardiner, game of "wa-wee." (Acc., 22998.)

Congo River, West Africa.—Edward Lovett, bag; belt (Acc. 24343); Cincinnati Museum Association, rattle; torch; witch switch; whip; pipe; mail currency; bracelet; ball of rubber; grass cloth (4 pieces); mats (5); pouch; pocket; dress; carrying basket; baskets (7); spear, bow and arrows (12); sword; knife; hoe; farm knife; tree climber; thatch material; wooden platter; mortar and pestle. (Acc. 24343.)

Angola, Africa.—Héli Chatelain, loin cloth; spoons (2); fetish image; bead necklace; hair from M'bamba negro; baskets (5); reading chart; mortuary images (7); images (2); belts (2); hat; monkey skin; doll; charm; head-dresses (3); charms (5); medicine images (2); charm ax; spindle and distaff; knife sheaths; spoon; copper currency; violins (2); pipes (2); native cloth; hammock; fan; mats (2); whistles (2); arm ring; knife awl; arrows (13); kilt; aprons (2); breechclout; rug; paint; fetish necklace; medicine horns (5); mats (4); caps (3); necklaces (4); bracelets; sieves (2); climbing ropes (2); sack; musical instruments (3); belt loom; slippers (1 pair); tobacco; love handkerchief; cartridge boxes (5); clubs (11); knives (2); hatchet;

hoes (7); shoemaker's kit; wooden platter; hemp pipes (2); pipe stems (25); snuff boxes (4); head scratcher; comb (Acc. 23435, 24070, 24190, 24258). The Bishop Taylor Mission; hatchet; coiled basket (Acc. 23667). Lieut. Mason A. Shufeldt, U. S. Navy, photographs (16), (Acc. 23460, 24344). W. H. Brown, wooden stool. (Acc. 23272.)

Japan.—W. W. Rockhill, hara-kiri dagger; samurai swords (1 pair); long swords (2) (Acc. 23372). Romyn Hitchcock, coir mats (2); woman's dress; game of alphabetical proverbs (Acc. 23462). F. T. Redwood, hara-kiri dagger; swords (2) (Acc. 23716). Lieut. T. Dix Bolles, U. S. Navy, fire vase (Acc. 24121). Department of education, Tokyo, drawings illustrating use of carpenter's tools (15) (Acc. 18415). P. L. Jouy, swords; shampooer's whistles (2); clam darts (Acc. 23753).

Korea.—W. W. Rockhill, marshal's baton; belt knife; matchlock gun; child's sandals (1 pair); quiver with arrows; *dharani* or magical formula buried with dead (Acc. 23372). P. L. Jouy, horsehair hats (2); hat button; arrow point straightener; baton; official girdle; writing paper; rosary; cover of fire box; pillows; tobacco boxes (2); windbell; incense burner; wooden bell; pallet; chest; image of Buddha; sword; cant hook; image of horse; donkey bell; images of warriors (2); official seal; figure of tiger god; knives and chopsticks (2); pocket knife; scroll pictures (3); picture book; announcement card; frying pot; photographs (43); old man's cane; ceremonial hat; flag; tobacco (Acc. 23753).

China.—W. W. Rockhill, cloisonné vase; cloisonné incense burner; bronze mythological figure; bronze lions; bronze vase; palace fan; enamel platters (3); hand warmer; lacquer cup; bronze koros (2); bronze candlestick; cloisonné jars (2); cloisonné vases (2); cloisonné pitchers (2); cloisonné koro; enamel dishes (2); enamel cup and saucer; enamel jewel boxes (2); perfume cups (2); water bottle; jewel tray; writing brush box; plan of Peking; tobacco pouch; shoes; belt knives with chopsticks (3); infantry swords (4); military sword; double swords (2); dagger (Acc. 23372, 24520). P. L. Jouy, double cutlasses (2) (Acc. 23753). Stewart Culin, slow matches; spirit cups (3); marbles; dice (10); fan tan outfit (5 pieces) (Acc. 24314). Dr. D. J. McGowan, pair of socks; folding headrests (2) (Acc. 23456). Julius Newmann, rain cloaks (4); irrigating wheel (model) (Acc. 24256). Mrs. E. J. Stone, shoes (1 pair) (Acc. 23319). J. W. Osborne, lithographs of Chinese life (17) (Acc. 23775). Thomas Dowling, jr., engravings of Tartar wars (Acc. 24134).

Thibet.—W. W. Rockhill, fly flappers (2); silver tea pot (Acc. 23372).

Easter Island.—Fred A. Norton, club (Acc. 23793) Parke, Davis & Co., copies of Easter Island tablets (2) (Acc. 19160).

Hawaii.—Dr. H. C. Bolton, photographs of surf boards and swimmers (3) (Acc. 23813).

Samoa.—Lieut. T. Dix Bolles, U. S. Navy, spears (2); clubs (4); kava strainers (2); kava root; necklaces (3); shell decoy; cigarette wrappers; finger ring; hair; woman's dress; baskets (5); mats (5); tapa cloth; gold mats (2); dictionary; fly brush; fans (2); walking stick; kava bowl; cocoanut drinking cups (2); stick to brace sides of canoe; fire sticks (2); net-making outfit; tapa-making outfit; waist cloths (2); belt; jacket; wreath of flowers; waist garment; pillow (Acc. 23390, 24120, 24121).

Fiji.—Lieut. T. Dix Bolles, U. S. Navy, pillow (Acc. 23390). Edward Lovett, tapa mallet (Acc. 23950); oil vessel; tapa cloth (Acc. 23390).

Pelew Islands.—Frank Curling, dugout canoe (Acc. 23888).

Marshall Islands.—Lieut. T. Dix Bolles, U. S. Navy, tapa cloth (Acc. 24121).

New Guinea.—Boston Museum of Fine Arts, spear (Acc. 23719) Edward Lovett, native's dress (Acc. 24343). Royal Gardens, Kew sleeping mat (Acc. 23358).

Australia.—J. W. Osborne, photographs (2) (Acc. 23775).

Solomon Islands.—Prof. I. C. White, priest's bowl (Acc. 23745). Edward Lovett, arm rings (4) (Acc. 24343).

South Sea Islands.—Dr. Hugh Smith, fig-leaf of brass (Acc. 23522).

Malay.—W. W. Rockhill, kris (2) (Acc. 23372).

REPORT ON THE DEPARTMENT OF AMERICAN ABORIGINAL POTTERY IN THE U. S. NATIONAL MUSEUM, 1891.

By WILLIAM H. HOLMES, *Honorary Curator.*

In this department during the fiscal year ending June 30, 1891, active operations have been unimportant, as the installment of material is practically complete. Accessions for the year are numerous, but no collections of especial importance have been received. The last catalogue number for June, 1890, is 135363; for June, 1891, 136183.

Such researches as have been conducted by the curator relate mainly to collections made by the Bureau of Ethnology during the past few years in the Mississippi Valley and along the Atlantic coast. They will be embodied in a forthcoming volume of contributions to the Bureau of Ethnology.

Reference is made in the bibliography (Section IV) to papers published by the curator during the year, relating to excavations in an ancient soapstone quarry in the District of Columbia, and to the Thruston tablet.

ACCESSIONS TO THE COLLECTION.

Acc. 23621.—Fragments of a bowl from New Mexico. Presented by Miss H. V. Ghiselin, Louisville, Ky.

Acc. 24012.—Pottery fragments, pottery disk, and fragments of earthen pipe. Transferred to the National Museum by the Bureau of Ethnology. These collections were made by Mr. William H. Holmes, Mr. H. L. Reynolds, Mr. Thomas Harper, Mr. John Bury, Mr. Charles Miller, and Mr. F. D. Snyder, in the District of Columbia, South Dakota, South Carolina, Iowa, Indiana, Arkansas, Maryland, New York, Michigan, Pennsylvania, and West Virginia.

Acc. 24160.—Pottery from Parker, Ariz. Presented by Mr. George A. Allen, United States Indian agent, Colorado River Agency, Parker, Ariz.

Acc. 24216.—Pottery from Carácas, Venezuela. Presented by Mr. R. M. Batlerman, legation of the United States, Carácas, Venezuela.

REPORT ON THE SECTION OF ORIENTAL ANTIQUITIES IN THE U. S. NATIONAL MUSEUM, 1891.

By CYRUS ADLER, *Assistant Curator.*

The work of the year proceeded on the lines hitherto marked out—the assembling of a study collection illustrative of Biblical archæology. From November 1 until the close of the fiscal year the assistant curator was absent on leave, having accepted a commission from the World's Columbian Exposition to proceed to the East in the interest of the Exposition. Much of his time previous to that was devoted to a collection of Jewish ceremonials which, while cognate in a sense to the work of the section, was separately installed.

ACCESSIONS.

Two casts of ancient Babylonian figures in the Louvre were added to the collection. These have been placed on exhibition and labels prepared. The one figure represents Gudea ("speaker" or "prophet") the ancient priest-king (who reigned about 3800 B. C.), as an architect. The following statement concerning this specimen has been prepared by Prof. Paul Haupt, the honorary curator.

Gudea is seated on a sort of stool in a religious attitude. The hands are clasped in the oriental posture of meditation and devotion. On his knees he holds a tablet with plan of a fortress. There are six gates flanked by towers, and the walls are surmounted by battlements. In front of this tablet there is a graduated rule, 10⅝ inches long (=27 centimeters, *i. e.*, a Babylonian half cubit), and at the side of it is the style with which the architect engraved his design. The figure is clad in a sleeveless cloak crossed over the breast and thrown back over the shoulder. The Arab of this region still drapes himself in the same fashion in his burnoose—a piece of woolen stuff with a fringe which is folded in two and wrapped around the body obliquely, so that it covers one arm and leaves the other bare.

The original is of blackish diorite with a bluish tinge. It was found with a number of sculptures, inscribed cylinders, fragments of vases, and remnants of various kinds of Chaldean art, in the ruins of an ancient temple, at Telloh, during the extensive excavations undertaken from 1877-'81, by the French vice-consul at Bassora, M. Ernest de Sarzec. His collection was purchased by the French Government, in 1881, for 150,000 francs ($30,000).

Telloh, or more accurately Tell-loh (Arabic *Tall-lûb i. e.*, "Mound of Tablets"), seems to represent the site of the ancient Chaldean city Shirpurla, or Lagash. It is situated in the midst of a morass about 5 miles east of the Shatt-el-Hai, an ancient canal connecting the Euphrates with the Tigris. Telloh is about 60 miles north of Mugheir (Arabic el Maghâ'ir, "The Caverns," *i. e.*, the Biblical Ur of the Chaldees whence Abraham went forth, Gen. XI, 31) and 45 miles east of Warka (the Erech of Nimrod, Gen. X, 10) in about the same latitude as Warka, only a little further south.

The inscriptions covering the figure are composed in the so-called Proto-Chaldean, *i. e.*, the language of Sumer (the Biblical Shinar) and Accad (Gen. X, 10) representing the non-Semitic idiom of the aborigines of Mesopotamia. According to some authorities this ancient language is said to be allied to the Turko-Tartaric family of speech of which the modern Turkish is the best known representative.

The writing is in the early hieroglyphic forms of the cuneiform script, and it runs not from left to right in horizontal lines as in the later Assyro-Babylonian inscriptions, but from above downward, beginning at the right and thence proceeding toward the left in parallel vertical columns, the face of the characters being turned towards the right, not to the left as in Chinese. The same arrangement is met with in the Egyptian hieroglyphics.

The writing always begins in the upper right-hand corner, viz:

V	Q	L	F	A
W	R	M	G	B
X	S	N	H	C
Y	T	O	I	D
Z	U	P	K	E

The inscription covering the figure is known as inscription B of Gudea.

Prof. Haupt has also prepared a translation of the inscriptions, a copy of which has been placed on the book table.

The casts of the Assyrian seals loaned by Prof. D. G. Lyon, of Harvard College, referred to in the last report, were labelled and placed on exhibition. Labels were also prepared for a miscellaneous collection from Egypt, Palestine, and Syria, made by Dr. Geo. W. Samson, and the collection was placed on exhibition.

Labels were also prepared for the British Museum collection of Egyptian photographs, for a series of Egyptian paper impressions, and for a collection of Egyptian originals, but none of these could be placed on exhibition owing to lack of space.

REPORT ON THE HISTORICAL COLLECTIONS IN THE U. S. NATIONAL MUSEUM, 1891.

By A. Howard Clark, *Curator.*

Work on the historical collections has been carried on with industry during the year, and much progress has been made toward a more comprehensive classification of the material that has accumulated since the beginning of this department in 1884. Fifty-six new accessions were received, including about three thousand individual objects. Several collections of ancient bronze and silver coins, and other historical objects were received by the curator and were returned to the owners with descriptive reports, identifying the objects. This branch of the curator's duty is becoming greater each year, and has resulted in the permanent accession of several valuable collections. Many letters of inquiry have been answered concerning the identity and value of medals, coins, and other objects.

Among the most important accessions of the year are: (1) The "Vail Papers" deposited by the heirs of Alfred Vail, and consisting of about thirty volumes of manuscript letters, drawings, and printed matter pertaining to the invention and history of the telegraph from 1837 to 1852. These papers are enumerated in detail below in the list of accessions. (2) Original full-size plaster model of the statue of Liberty, from which was cast the bronze statue surmounting the dome of the United States Capitol. This model was made in Rome, Italy, by Thomas Crawford, American sculptor (born 1814, died 1857), and the bronze was cast by Clark Mills, in Washington, 1860; height, 19 feet 6 inches. (3) Album of portraits of the officers and members of the International American Conference, held at Washington in 1889–'90. (4) A silver watch captured from a British officer at the battle of Lexington in 1775, also the silver watch carried by Thomas Cheyney, who did valiant service at the battle of Brandywine during the Revolutionary war. (5) A Bible (Pentateuch) in Sechuana language, carried by Dr. David Livingstone in his journey in Africa in 1852, with autograph of Livingstone on title page. (6) Royal account-book of Louis XV and Louis XVI of France, with autograph of Louis XVI approving the accounts. (7) Collection of almanacs from 1730 to 1750. (8) A large collection of personal papers

and relics of George Washington, including also the original will of John Washington, the founder of the family in America. (9) Silver-mounted glass flute, presented to President James Madison. (10) Six medals in silver and bronze struck in Holland in 1782–'83 to commemorate the success of the Americans in the Revolutionary war. (11) Manuscripts, early publications, and objects pertaining to the early history of Kentucky and of the Shenandoah Valley. (12) Collection of 855 official seals of European governments and institutions. (13) Medals and diplomas awarded the United States Government by the Paris Exposition. (14) Six additional medals of the series struck by order of the corporation of the city of London, England, to commemorate important events, including the passage of the reform bill, the opening of London Bridge, etc.

The routine work on the collections has consisted in the preparation of labels and arranging the objects for exhibition. Very little could be done in making a detailed catalogue, for upwards of three thousand individual objects have been received, and without any assistant the curator has found it impossible to keep up with the work. Each accession, however, of which fifty-six have been received during the year, has been carefully preserved in its identity, so that there will be little difficulty in cataloguing the specimens hereafter.

The systematic card catalogue of the collection has been carried along, as also the alphabetical card catalogue of the several accessions, which number about eight hundred.

In December, 1890, the curator spent four days in Virginia and West Virginia, for the special purpose of examining some collections of papers and other personal relics of Gen. Washington in possession of some of the Washington family residing in Fauquier County, Va., and in Charlestown, W. Va., and a large number of interesting papers were secured as a loan to the National Museum. They attracted much attention while on exhibition, but were withdrawn after several months by the owners and sold at auction in Philadelphia. Among the interesting places so numerous in the Shenandoah Valley, the curator visited the old town of Strasburg, a place settled upwards of a hundred years ago by Germans from Pennsylvania (and still bearing evidence of its German origin), and also the region about Winchester, Charlestown, and Harpers Ferry.

The present condition of the several parts of the historical collections is as follows:

PERSONAL RELICS OF EMINENT MEN.

It is intended to exhibit relics of each President of the United States, also of eminent soldiers, statesmen, explorers, and inventors, men eminent for scientific attainments, etc.

The large collections of relics of Washington and Grant have acted as strong magnets to attract other accessions to this department, so

that there are now exhibited relics of Washington, Adams, Jefferson, Madison, Van Buren, Gen. Harrison, Jackson, Lincoln, and Grant among the Presidents; of Elliott, Ripple, Perry, Grant, Hancock, Paul, Harney, Shields, and other prominent soldiers and sailors; of Benjamin Franklin, Morse, Vail, Whitney, Fulton, Sir John Franklin, Kane, Livingstone, and other eminent scientists, inventors, and explorers.

RELICS OF IMPORTANT HISTORICAL EVENTS IN THE HISTORY OF AMERICA.

This part of the collection is growing steadily. There are already on exhibition documents and various objects connected with the early colonial period, the French and Indian wars, the period of the Declaration of Independence, and the Revolutionary war, the formative period of the Constitution, the war of 1812, the Mexican war, the war of the rebellion, besides papers and objects to illustrate the history and abolition of slavery.

MEDALS AND MONUMENTS.

The medallic history of the United States is quite fully shown by the Museum collection, which now includes all the medals struck by order of Congress, a large number of medals commemorating national and local events of greater or less importance, and quite a full series of the smaller class of medals and tokens exhibiting the medallic history of the Presidential campaigns, centennials and bicentennials of settlements of towns, etc. The Museum collection of foreign medals is not very complete, though there are many specimens of much interest.

Monuments are classed next to medals as commemorating events or as preserving the memory of eminent men. Something has been done towards making a list of the monuments in the United States commemorating events of national importance, and photographs or other illustrations of many monuments have been collected. The Memorial Arch, at Hartford, Conn., erected in memory of the men who fell in the war of the Rebellion, is, perhaps, the most interesting monument connected with the rebellion period of our history.

All over the country there are buildings, bridges, etc., such as Independence Hall, in Philadelphia; Faneuil Hall, in Boston; the Old North Bridge, at Concord, and the bridge at Salem, that stand as monuments to perpetuate the memory of historic events, and it is proper that the Museum should exhibit illustrations of them.

PORTRAITS OF EMINENT MEN.

The portrait collection numbers several thousand, and has been enlarged during the year by the addition of several hundred engravings of eminent Americans and foreigners. Much work has been done in mounting them on standard cards. A complete catalogue has not yet

been made. There have been on exhibition several hundred engraved portraits of some of the eminent scientists of the past four centuries, also several hundred portraits of medical men, these last forming the loan collection of Dr. J. M. Toner.

MONEY OF THE WORLD.

About two years ago the curator was directed to begin the formation of a collection to illustrate the money of the world, and within a few months the collection was given a good start by the gift of several hundred copper and silver coins of modern times, and by loans of nearly two thousand ancient Greek and Roman coins. Part of the collection is labeled and placed on exhibition, but the greater portion can not be shown for want of exhibition space. The shell money of the Indians of our country during the early colonial period is interesting to the public. This collection was arranged by the curator of the department of mollusks, and shows the shells from which the money was made, the discs used as coin, and the belts of wampum. Accompanying the exhibit is an instructive pamphlet, giving in detail the history of the manufacture and uses of this money. The collection of paper money is steadily growing, and most of the principal countries of the world are now represented.

The interesting series of issues of Continental paper money of our country and the State bank series is far from complete, though being added to by frequent acquisitions.

POSTAGE STAMPS.

There were but few additions to the stamp collection during the year, and but little time could be given toward arranging the collection for exhibition. The Museum now has about three thousand stamps exclusive of duplicates, and many of them are of rare issues.

AMERICAN HISTORICAL ASSOCIATION.

For three successive years the American Historical Association has held its annual meeting in Washington during the Christmas holidays. The morning sessions have been held in the lecture hall of the National Museum and the evening sessions in the Columbian University. This association has a membership of about six hundred eminent historians, teachers, and students of history from all parts of the United States.

The curator of historical collections in the Museum is assistant secretary and curator of the association, and has received into his charge some collections of books and papers deposited for exhibition in the Museum by permission of the Regents of the Smithsonian Institution, as authorized by the act of incorporation of the association. The most important of these collections are the "Vail papers," enumerated in detail in the list of accessions, and pertaining to the early history of the tele-

graph. These were deposited with the association by Messrs. J. Cummings Vail, Stephen R. Vail, and George R. Vail, surviving heirs of the late Alfred Vail, of New Jersey.

The association is directed by the act of incorporation to report annually to Congress, through the Secretary of the Smithsonian Institution, concerning the condition of historical study in America.

The first annual report was transmitted to the Smithsonian Institution on June 13, 1890, by Dr. H. B. Adams, secretary, and was submitted to Congress on June 16. By the Senate it was referred to the Committee on the Library and ordered to be printed as Senate Miscellaneous Document, No. 170, Fifty-first Congress, first session. The document was put in type during the fall of 1890, and forms an octavo volume of 427 pages, containing—

(1) General report of the proceedings at the annual meeting held at Washington, D. C., December 28–31, 1889.

(2) Inaugural address of President Charles Kendall Adams on recent historical work in the colleges and universities of Europe and America.

(3) The spirit of historical research, by James Schouler, of Boston.

(4) The origin of the National Scientific and Educational Institutions of the United States, by Dr. G. Brown Goode.

(5) Bibliography of the published works of members of the American Historical Association.

The regular document edition (1,900) copies of this report is all that was officially printed and distributed in the usual manner by the Senate and House of Representatives. The association, however, had a private edition of 500 copies printed in December, 1890, and a second edition of 1,000 copies on special paper was printed during the spring of 1891. The reports have been distributed to the leading historical associations and institutions in the United States and foreign countries.

The seventh annual meeting of the association was held December 29–31, when some loan collections of objects pertaining to American history were brought together in the lecture hall to supplement the regular exhibition in the north hall.

The programme of the meeting was as follows:

PROGRAMME OF THE SEVENTH ANNUAL MEETING OF THE AMERICAN HISTORICAL ASSOCIATION (DECEMBER 27–31, 1890).

Inaugural address. By the Hon. John Jay, LL. D., president of the association.

Canada and the United States: From historical points of view. By Dr. J. G. Bourinot, C. M. G., clerk of the Canadian house of commons.

The New England Settlements in Acadia. By Benjamin Rand, PH. D., Cambridge, Mass.

The Legislative Work of the First Parliament of Upper Canada., 1792–1796. (Abstract.) By William Houston, M. A., librarian to the Ontario legislature, Canada.

The Fate of Dietrich Flade. By Prof. George L. Burr, Cornell University.

The Theory of the Village Community. By Dr. Charles M. Andrews, Bryn Mawr.

A Plea for Reform in the Study of English Municipal History. By Dr. Charles Gross, Harvard University.

Mirabeau's Speech of May 20, 1790. By F. M. Fling, PH. D. (Leipzig.)

The Formation of the French Constitution. By Prof. Adolphe Cohn, Harvard University.

Karl Follen and the Liberal Student Movement in Germany, from 1815 to 1819. By Prof. Kuno Francke, Harvard University.

Bismarck as the Typical German. By William G. Taylor, esq., of New York City.

How the Written Ballot came into the United States. By Douglas Campbell, esq., New York City.

A Virginia Bill of Attainder. The case of Josiah Philips. By Prof. William P. Trent, University of the South, Sewanee, Tenn.

Amendments to the Constitution of the United States. By Herman V. Ames, A. M., Harvard Graduate School.

Presidential Protests. By Edward Campbell Mason, A. B., Harvard Law School.

Responsible Government in Canada. By Dr. J. G. Bourinot, C. M. G., clerk of Canadian House of Commons.

Bills of Right in State Constitutions. (Abstract.) By Gen. R. D. Mussey, Washington, D. C.

The Historical Development of the Budget in the United States. By Ephraim D. Adams, Ph. D., University of Michigan.

The Yazoo Land Companies. By Dr. Charles H. Haskins, University of Wisconsin.

State Activities and Politics. By W. F. Willoughby, United States Department of Labor.

Slavery in New York. By Edwin V. Morgan, A. B., Harvard Graduate School.

Slavery in the District of Columbia: The Policy of Congress and the Struggle for Abolition. By Mary Tremain, A. M. Paper to be read by Prof. George E. Howard, University of Nebraska.

Raleigh's Settlements on Roanoke Island: An Historical Survival. By Stephen B. Weeks, Ph. D., University of North Carolina.

Political Ideas of the Puritans. By Dr. Herbert L. Osgood, adjunct professor of Columbia College.

Coöperation among the State Historical Societies. By Gen. C. W. Darling, Utica, N. Y.

The Organization of Historical Material. By W. H. Mace, M. A., Cornell University.

Is History a Science? By Prof. R. H. Dabney, University of Virginia.

The Teaching of History. By Prof. Edward Channing, Harvard University.

The Philosophical Aspects of History. By Dr. William T. Harris, Commissioner of Education.

Importance of Geography to the Reader and Student of History. By President D. C. Gilman, Johns Hopkins University.

Webster's Seventh of March Speech. By James Schouler, of Boston.

The Border Land between the Archæologist and the Historian. By Prof. Otis T. Mason, U. S. National Museum.

The Expenditures of Foreign Governments in behalf of History. By Prof. J. F. Jameson, Brown University.

The second official report of the association was transmitted to the Smithsonian Institution on February 25, 1891. It was submitted to Congress by the Secretary of the Smithsonian Institution on February 26, and on the following day the Senate ordered it to be printed. It was partly in type before the close of the fiscal year and will be published as Senate Mis. Doc. No. 83, Fifty-first Congress, second session.

The report will cover about 300 octavo pages and contains:

(1) Report of proceedings at the annual meeting, December 29–31, 1820.

(2) Inaugural address of John Jay, president of the Association: The Demand for Education in American History.

(3) Abstracts of the several papers on American, Canadian, and European history, read at the annual meeting.

(4) Bibliography of published writings of members of the association for 1890.

(5) Bibliography of the national and State historical associations of the United States.

LIST OF ACCESSIONS DURING THE YEAR ENDING JUNE 30, 1891.

From the American Historical Association: Manuscripts and drawings pertaining to the history of the telegraph from 1837 to 1852, deposited with the association by the surviving heirs of Alfred Vail, who was associated with Prof. Morse in the invention and introduction of the telegraph.

From George H. Boehmer, Washington, D. C., collection of eight hundred and fifty-five seals, in paper and wax, of European governments and institutions.

From Col. J. B. Bowman, Little Rock, Ark., manuscripts, deeds, books, and historical relics pertaining to the pioneer history of the Shenandoah Valley and Kentucky.

From C. B. Boyle, Washington, D. C., silver-mounted glass flute, made in Paris, and presented to President James Madison.

From Rev. W. C. Calder, Chester, Pa., five silver coins of Burmah.

From H. Chatelain, Vineland, N. J., a bible (Pentateuch) in Sechuana language, used by Dr. David Livingston in his journey from Cape of Good Hope to Loanda, Africa, in 1852, the autograph of Livingston on title page; also forty-three copper coins of Portuguese, Africa, and Azores.

From J. L. Cheyney, Fort Dodge, Iowa, a silver watch carried by Thomas Cheyney during the Revolutionary war and particularly during his service to the American forces at the battle of the Brandywine.

From Edward Clark, Architect of the United States Capitol, the original full-size plaster model of Statue of Liberty, by Thomas Crawford, made in Rome, and used in making the mold from which was cast the bronze statue surmounting the Capitol dome.

From Miss Una H. Clarke, Washington, D. C., commissions of notary public signed by Governor Marcus Morton, 1825, and Governor Levi Lincoln, 1828, of Massachusetts.

From Charles W. Cotton, Dunbar, Pa., piece of charcoal from the ill-fated Hill Farm Mine.

From Josiah Cuffy, Fort Monroe, Va., twenty silver and copper coins of Spain, Germany, Switzerland, Canada, and the United States.

From William Ellory Curtis, Washington, D. C., an album of photographs of the officers and members of the International American Conference, held at Washington in 1889–'90.

From Department of State, Washington, D. C., two medals with accompanying diplomas awarded the United States for exhibits at the Paris Exposition, 1889.

From George H. Draper, Paris, France, the private account book of Louis XV and Louis XVI of France, with signature of Louis XVI.

From Charles F. Fish, Fall River, Mass., photographs of old stone mill at Newport and of a windmill at Portsmouth, R. I.

REPORT ON THE SECTION OF GRAPHIC ARTS IN THE U. S. NATIONAL MUSEUM, 1891.

By S. R. Koehler, *Curator.*

The work done during this year does not show perceptibly in the appearance of the collections under my charge, so far as they have been placed on exhibition. The aim has been to make the several divisions more complete by filling gaps here and there, and these additions are, as a matter of course, lost in the mass to the general observer, while some of them have not yet been placed in position. This is more especially true of several series of specimens lately acquired, in illustration of a number of photo-mechanical processes. Special attention has been given to the development of the division comprising these interesting and most important processes, and the additions recently made will compel a rearrangement of the whole division.

The accessions for the year, both by gift and by purchase, although not as numerous as in previous years, have yet been by no means unimportant. The lists herewith submitted show that many of the friends of the Museum especially interested in the Section of Graphic Arts have again remembered it, and that the coöperation of others has been enlisted in addition. Among the gifts specially to be mentioned is a series of specimens fully illustrating the photo-lithographic process invented by Mr. J. W. Osborne, prepared by Mr. Fernald, of New York, under the supervision of the inventor himself, and given by him to the Museum; a small collection of Japanese color-prints and illustrated books, received from Mr. T. Tokuno, chief of Insetsu Kioku, Tokio, Japan, and an impression from a heliogravure plate made by Nicephore Niepce in 1824, the gift of Mr. Ch. Gindriez, of Châlons-sur-Saône, France. The historical interest attaching to this specimen will be manifest at once when it is considered that it is printed from the first measurably successful plate produced by Niepce, who was the pioneer in this department of scientific research. The purchases include a silver-point drawing by Prof. Legros, of London; an aquatint plate, with proofs from it, illustrating the wet ground process, and specially made for the Museum by

Mr. Jas. D. Smillie, N. A.; technical illustrations of several photo-mechanical processes, to wit, the photo-aquatint process (prepared for the Museum by the New York Photogravure Company) the zinc-etching process for line work, the wash-out gelatine process, and a half-tone process involving the use of line screens (these three prepared for the Museum by the New York Engraving and Printing Company), a set of wood blocks, with the progressive proofs from them, of a chromoxylograph by Gubitz, of Berlin, one of the earliest specimens of this kind produced in the nineteenth century, and a number of impressions from plates and blocks engraved by artists of past centuries, illustrating various processes, but more especially the development of color-printing. A beginning has also been made, thanks to the generosity of Messrs. F. W. Devoe & Co., of New York, and Mr. M. Falconer, of Brooklyn, in the formation of a collection of artists' tools and materials.

The labeling of the specimens on exhibition has been continued, and the cataloguing of the Osborne collection (see previous reports) has at last been accomplished. A beginning has also been made with the cataloguing of the collection of patents. The progress to be recorded, owing to lack of time and of facilities, is not, however, as satisfactory as might be desired.

The time has hardly arrived for making special researches upon material belonging to the Section of Graphic Arts. The acquisition, however, of a couple of specimens of the so-called "*manière criblée*" cuts, has made it possible to illustrate this interesting subject intelligently, and to enforce the conclusion arrived at by me some time ago, that these cuts are really white-line and tint work of a very rude kind, but in principle identical with the refined work of the most advanced wood engravers of our own day. These conclusions have been embodied in a paper entitled "White-line Engraving for Relief-printing in the Fifteenth and Sixteenth Centuries," published, with illustrations, in the Museum Report for 1890.

The last number entered on the catalogue of the Section of Graphic Arts for the year ending June 30, 1890, having been 3,471, and the corresponding number for the year now under review being 4,797, it follows that the number of entries during the year has been 1,326. As many of these entries, however, comprise more than one specimen, it will be safe to say that the total number of specimens represented by them is between 1,400 and 1,500. But this number does not give the absolutely new accessions of the year, as it includes the entries, to the number of 952, of the Osborne collection, which was received and reported among the accessions several years ago. The entries representing absolutely new material are, therefore, reduced to 374. The duplicates of the Osborne collection, consisting of specimens of photo-mechanical process work, have been laid aside, but not yet catalogued.

The Bibliography (Section IV) contains notices of the papers, etc., published by me during the year.

LIST OF ACCESSIONS RECEIVED AS GIFTS, ARRANGED ALPHABETICALLY ACCORDING TO NAMES OF DONORS, FOR THE YEAR ENDING JUNE 30, 1891.

Avery, S. P., New York: Etching, lithographs, etc., by French artists. (Cat. Nos. 4691–4741.)

Bureau of Engraving and Printing, Washington, D. C.: Specimens of lathe work, portraits and vignettes for bank notes. (Deposited.) (Cat. Nos. 3475–3537.)

Champney, J. Wells, New York: Lithographs and a woodcut by American artists. (Cat. Nos. 4674–4688.)

Chandler, Prof. C. F., New York: Specimens of photo-mechanical process work. (Cat. Nos. 3611–3619.)

Cheney, Mrs. Ednah D., Jamaica Plain, Mass.: Two engraved portraits. (Cat. Nos. 3558 and 3644.)

Davis, John P., New York: Two proofs of wood engravings by the donor. (Cat. Nos. 3620 and 3621.)

Devoe, F. W. & Co., New York: Specimens of oil colors in bladders. (Cat. Nos. 3665–3675.)

Estes & Lauriat, Boston; Blind impression from an etching. (Cat. No. 3559.)

Falconer, J. M., Brooklyn, N. Y.: Illustrations of methods of putting up water colors; artists tools. (Cat. Nos. 3676–3719, 4762–4766.)

Gindriez, Ch., Châlons-sur-Marne, France: Heliograph by Nicephore Niepce. (Cat. No. 3473.)

Hayden, Mrs. C. W., Washington, D. C.: Eight engravings. (Cat. Nos. 3538–3545.)

Hubbard, Gardiner G., Washington, D. C.: Two catalogues. (Cat. Nos. 3556 and 3557.)

Ives, Frederick E., Philadelphia: Pamphlet by the donor, "Photography in the colors of nature." (Cat. No. 3629.)

Osborne, J. W., Washington, D. C.: Specimens of photo-mechanical process work, including a complete technical elucidation of the donors own process, books, pamphlets, etc. (Cat. Nos. 3560–3578, 3643, 3720–4671, 4742–4761.)

Smillie, James D., N. A., New York: Three aquatints by the donor (Cat. Nos. 3579–3581).

Staigg, Mrs. R. M., Boston: Two engravings (Cat. Nos. 3641 and 3642).

Stroud, Mrs. Mary I., Washington, D. C.: One mezzo-tint portrait (Cat. No. 3474).

Tokuno, T., Tokio, Japan: Six specimens of Japanese color-prints, and five Japanese illustrated books (Cat. Nos. 3630–3640).

Ward, S. G., Washington, D. C.: One etching by Callot (Cat. No. 3653).

Watkins, J. E., Washington, D. C.: Cuttings from journals relating to technical matters (Cat. Nos. 3600 and 3601).

Wolfe, M., Dayton, Ohio: Specimens of photo-mechanical process work (Cat. Nos. 3245–3251).

REPORT ON THE SECTION OF TRANSPORTATION AND ENGINEERING IN THE U. S. NATIONAL MUSEUM, 1891.

By J. ELFRETH WATKINS, *Curator.*

During the last fiscal year the collections in the section of transportation and engineering have been materially strengthened. This is especially so in the branch of mechanical engineering, where it is hoped eventually to secure a series of objects to illustrate the birth and development of the mechanic arts, with special reference to the evolution of the epoch-making inventions.

The United States Patent Office, where thousands of models, drawings, and descriptions of machines are preserved, is the great repository from which the history of the development of inventive thought may be studied, but the student of the history of invention interested in ascertaining the influence that inventive action has had upon the occupations, habits, and customs of the human race is desirous to examine also the products resulting from this inventive development, especially those that have been put in practical service for the benefit of mankind. To this end many of the objects exhibited at the decennial celebration of the establishment of the electric-lighting industry, held in Providence, R. I., in February, 1891, have found a permanent place in the collection, together with other specimens from the Loan Collection temporarily installed in the Museum lecture hall during the Patent Centennial Celebration held at Washington in April last.

The objects relating to the infancy of electric lighting in America are of the greatest interest, and a comparison of the crude sewing machines, typewriters, and other devices recently collected, with the modern achievements of the mechanic's handiwork, is also most striking. Since these relics of invention have proven of great interest to the public, the coöperation of all persons interested is solicited in the extension of the section in this direction.

The work of labeling and cataloguing specimens in the exhibition series was completed during the year.

The electrical collection, of which the Museum formerly possessed only a valuable nucleus, was enriched by the addition of the original electromagnetic engine designed by Joseph Henry, the first Secretary of the Smithsonian Institution in 1831, deposited by his daughter. This little

machine, which was construced by his own hands, is one of the earliest applications of magneto-electricity to the production of power. Professor Henry calls it "reciprocating motion produced by magnetic attraction and repulsion."

In July, 1831, writing to the editor of Silliman's Journal, he says:

I have lately succeeded in producing motion in a little machine by a power which, I believe, has never before been applied in mechanics—by magnetic attraction and repulsion.

Not much importance, however, is attached to the invention since the article in its present state can only be considered a philosophical toy, although in the discovery and invention it is not impossible that the same principle, or some modification of it on a more extended scale, may hereafter be applied to some useful purpose. But without reference to its practical utility, and viewed only as a new effect produced by one of the most mysterious agents of nature, you will not, perhaps, think the following account of it unworthy of a place in the Journal of Science.

It is well known that an attractive or repulsive force is exerted between two magnates, according as poles of different names, or poles of the same name, are presented to each other.

In order to understand how this principle can be applied to produce a reciprocating motion, let us suppose a bar magnet to be supported horizontally on an axis passing through the center of gravity, in precisely the same manner as a dipping needle is poised; and suppose two other magnets to be placed perpendicularly, one under each pole of the horizontal magnet, and a little below it, with their north poles uppermost; then it is evident that the south pole of the horizontal magnet will be attracted by the north pole of one of the perpendicular magnets, and its north pole repelled by the north pole of the other; in this state it will remain at rest, but if by any means we reverse the polarity of the horizontal magnet, its position will be changed and the extremity, which was before attracted, will now be repelled. If the polarity be again reversed, the position will again be changed, and so on indefinitely. To produce, therefore, a continued vibration, it is only necessary to introduce into this arrangement some means by which the polarity of the horizontal magnet can be instantly changed, and that, too, by a cause which shall be put in operation by the motion of the magnet itself; how this can be effected will not be difficult to conceive, when I mention that instead of a permanent steel magnet in the movable part of the apparatus, a soft iron galvanic magnet is used.

The motion here described is entirely distinct from that produced by the electromagnetic combination of wires and magnets; it results directly from the mechanical action of ordinary magnetism, galvanism being only introduced for the purpose of changing the poles.

At the end of sixty years the same principle, that led the great physicist (who is known to the world as a discoverer rather than an inventor) to make this "little machine," is used in constructing the electrical devices which may be properly classed among the mechanical triumphs of this century of invention.*

A deposit was made of two original letters written to S. Vail & Son, in 1838, by Alfred Vail, while associated with Prof. Morse. They describe Mr. Vail's relations with Prof. Morse, and the operations of the first practical electro-magnetic telegraph machine then being tested before the Committee on Commerce at the United States Capitol. This

*See article "Henry's Electric Motor Constructed in 1831," by J. Elfreth Watkins, Electrical World, May 9, 1891.

original instrument, invented and constructed by Alfred Vail, by which the historic message, "What hath God wrought," was received at the Baltimore end of the first telegraph line, May 24, 1844, is also preserved in the collection, where it was deposited by the sons of the great inventor some years ago.

In addition to these letters are several sheets of drawings and lithographs of the early machines, all deposited by Mrs. Amanda Vail, widow of Alfred Vail; also a paper ribbon containing a dot-and-dash record of the first Presidential election reported by telegraph in 1844. This relic was deposited by Stephen Vail, son of the inventor.

Mr. J. E. Hinds, of Brooklyn, N. Y., has added greatly to the value of the electrical series by depositing a collection of incandescent lamps, switches, and other apparatus used in 1881 in one of the earliest electric-light plants in America. These relics formed an important part of the Loan Collection at the Electrical Celebration at Providence, in February, 1891, previously alluded to.

In my last report the fact that the original boiler of the historic locomotive "Stourbridge Lion" had been acquired, was mentioned. It gives me pleasure now to state that one of the original cylinders of this locomotive has been deposited by Lindsay & Early, of Carbondale, Pa., to whom the Museum is also indebted for the boiler. As before stated, "it is the intention to mount the boiler on the original driving wheels, collected in 1888." The accession of the cylinder will make possible a more complete restoration of this historic locomotive.

The series illustrating the development of the car wheel has been added to by a gift from Mr. Theodore N. Ely, general superintendent of motive power Pennsylvania Railroad, of a car wheel of the type in use when the first locomotives were put on the New Jersey Railroad, in 1831. It is quite similar to the wheels used under the passenger cars when they were drawn by horses, prior to the introduction of locomotives, on the first portion of the Pennsylvania Railroad, opened for traffic in 1834.

Through the courtesy of the master mechanic of the New York Central and Hudson River Railroad Company, one of the original driving wheels of the locomotive "De Witt Clinton" has found a place in the collection. The "De Witt Clinton" was built at the West Point Foundry, New York, in 1831, and was the first locomotive constructed in America to do work. It was also the first engine placed in service on the Albany and Schenectady road, the oldest railway in the State of New York.

This engine was the subject of the illustration in silhouette, familiar to all students of the early history of the American railway.

PATENT CENTENNIAL CELEBRATION.

Early in December, the plans which had been under discussion for several months for celebrating the beginning of the second century of the American patent system, in a manner commensurate with the vast importance of the interests *involved, crystallized* by the appointment of

a central committee composed of citizens of Washington, who were empowered to proceed with the arrangements for the celebration. Having at the unanimous request of this committee accepted the general secretaryship of the organization, I proceeded to devote as much time to matters relating to the celebration as my other duties would permit, feeling that a more intimate acquaintance with the inventors of the country, and those interested in the manufacture of patented articles would result in the extension of such of the Museum collections as relate to the development of the mechanic art.

The ceremonies were held in Washington on the 8th, 9th, and 10th of April, 1891. They consisted of a series of meetings at which addresses relating to the history and influence of invention were delivered by prominent statesmen, political economists, and engineers. The following addresses were delivered:

Hon. Charles Eliot Mitchell, of Connecticut, Commissioner of Patents: "The Birth and Growth of the American Patent System."

Hon. O. H. Platt, LL. D., of Connecticut, United States Senator: "Invention and Advancement."

Hon. Carroll D. Wright, A. M., of Massachusetts, Commissioner of Labor: "The Relation of Invention to Labor."

Hon. Samuel Blatchford, LL. D., justice of the Supreme Court of the United States: "A Century of Patent Law."

Hon. Robert S. Taylor, of Indiana: "The Epoch Making Inventions of America."

Hon. John W. Daniel, LL. D., of Virginia, United States Senator: "The New South as an Outgrowth of Invention and the American Patent Law."

Hon. Edwin Willits, of Michigan, Assistant Secretary of Agriculture: "The Relation of Invention to Agriculture."

Hon. Benjamin Butterworth, of Ohio, United States House of Representatives: "The Effect of our Patent System on the Material Development of the United States."

Octave Chanute, of Illinois, president of the American Society of Civil Engineers: "The Effect of Invention upon the Railroad and Other Means of Intercommunication."

Hon. A. R. Spofford, LL. D., Librarian United States Congress: "The Copyright System of the United States: its Origin and its Growth."

Thomas Gray, C. E., B. SC., F. R. S. E., of Indiana, professor of dynamic engineering, Rose Polytechnic Institute, Terre Haute: "The Inventors of the Telegraph and Telephone."

Col. F. A. Seely, of Pennsylvania, principal examiner United States Patent Office: "International Protection of Industrial Property."

William P. Trowbridge, PH. D., LL. D., of New York, professor of engineering, school of mines, Columbia College: "The Effect of Technological Schools upon the Progress of Invention."

Robert H. Thurston, A. M., LL. D., DOC. ENG., of New York, director and professor of mechanical engineering, Sibley College, Cornell University: "The Invention of the Steam Engine."

Cyrus F. Bracket, M. D., LL. D., of New Jersey, Henry professor of physics, College of New Jersey, Princeton: "The Effect of Invention upon the Progress of Electrical Science."

Maj. Clarence E. Dutton, Ordnance Department, U. S. Army: "The Influence of Invention upon the Implements and Munitions of Modern Warfare."

Prof. F. W. Clarke, S. B., of Ohio, chief chemist U. S. Geological Survey: "The Relations of Abstract Scientific Research to Practical Invention, with Special Reference to Chemistry and Physics."

Hon. William T. Harris, Commissioner of Education: "The Relation of Invention to the Communication of Intelligence and the Diffusion of Knowledge by Newspaper and Book."

Prof. Otis T. Mason, PH. D., of Virginia, curator U. S. National Museum: "The Birth of Invention."

Edward Atkinson, PH. D., LL. D., of Massachusetts: "Invention in its Effects upon Household Economy."

Dr. John S. Billings, curator U. S. Army Medical Museum: "American Invention and Discoveries in Medicine, Surgery, and Practical Sanitation."

During the meetings, which were attended by citizens from all parts of the country, a loan collection was installed in the lecture hall of the National Museum, where machines of antique design, models, and early patents were inspected and studied by many visitors drawn to Washington by their interest in the Patent Centennial Celebration. In this attractive collection were patents signed by James Madison, President of the United States, and James Monroe, Secretary of State, March 3, 1813, granting to John W. Bronough and Jesse Talbot the sole right to manufacture a refrigerator. Several patents and assignments of patents granted by the English Government in 1877 were also in the collection.

No better description of the character of this loan exhibition can be furnished than that contained in the Washington Evening Star, April, 1891, which reads as follows:

The first two talking machines ever made are on exhibition in the lecture hall of the National Museum. There are a great many other curious things gathered in that apartment just now, put there for the edification and instruction of those who are interested in the Patent Centennial, which is now in full working order. There is a case full of talking machines, and subscribers who are continually tangling themselves up with "Central" may be able to discover in the interior of one of the instruments the cause of their trouble.

The first talking machine is a small walnut cone divided. The apex is the receiver, the truncated portion is the transmitter. Those who ought to know say that it talks well, but no company could collect $90 per annum upon any such looking thing as it is. Bell's liquid transmitter is in the case, and so is the first form of hand telephone. This must have made even the inventor tired, for it is enormously large, and affords a striking contrast to the ear trumpet now so common. The first experimental forms of the Blake transmitter are shown, and alongside of them are the component parts of the long-distance telephone. How far this latter will work no one knows.

Mr. H. V. Hayes, who is arranging the exhibit, talked this morning with his family in his home at Cambridge, Mass., a mere matter of 500 miles. Edison's motophone is shown in the telephone case.

AN ANTIQUE ELECTRICAL RAILROAD.

An antique electrical railway, dating back to 1837, is one of the interesting curios of the collection, attracting as much general attention, perhaps, as the original telegraph instruments used at the Baltimore end of the line which made S. F. B. Morse and Stephen Vail famous.

THE GROWTH OF PHOTOGRAPHY.

A good many people clustered this morning about a big case in the center of the room. The growth of photographic mechanism was there shown. The first camera ever made in the United States—a plain, clumsy, wooden box, bearing the date 1839—stood alongside two portable tripod cameras of 1890 and looked much more awkward. In the corner is the contract of partnership between Niepce and Daguerre.

On the upper shelf in the same case a brass cylinder fully 2 feet in height stood alongside a little scrap of mechanism that could be put in a little boy's vest pocket, and unwieldy by contrast. Just below the old camera was the gem of the collection—an original daguerreotype of Daguerre. It is in first-class condition and is a better picture than many so-called photographers can produce even now. The big cylinder, which is 6 inches in diameter, is a "rapid lens, made in 1846; the other is also a rapid lens, but it was made this year, and is only an inch long and an inch in diameter. Both lenses are for the same plate, viz, 10 by 12 inches.

A hand camera in 1884, for a 5 by 7 inch plate, was as big as a full-grown valise. Near the specimen in the case is a hand camera of 1890, and it is comparatively a baby in point of size.

The instantaneous "shutter" that was regarded as perfect in 1858, is nothing but a brass slide with two holes in it for exposures. It is a crude looking affair when compared with the beautiful piece of mechanism alongside it—the instantaneous shutter of to-day, in which the movement of the iris of the eye is imitated precisely, and by which as short an exposure as the one hundred and fiftieth part of a second is possible.

The development of the Signal Service weather maps is made plain on a large board, but there is no evidence to show that the weather has improved with the maps. A row of mutilated poker chips is immediately below the specimens of ancient and modern meteorological prophesy.

Side by side are the original Joseph Francis life car and the car now in use by the U. S. Life-Saving Service.

The Benjamin Franklin hand press is under glass in the center of the room, and so is a collection of time-indicators, sun dials, clepsydra, hour glasses, and watches. With these latter is a chronoscope, an instrument that can cut a second into five hundred parts.

The Steinert collection of musical instruments is another center of attraction, from the earliest keyed instruments, the clavichord of Mozart and Beethoven's tunes, through the intermediary harpsichords and pianos down to the modern upright.

A COLLECTION OF TYPEWRITERS.

A collection of typewriters has been assembled this afternoon, not female operators, but the writing machines. Some of them are very clumsy and have an extremely antique appearance, although none of them are very old.

Guns, revolvers, and knives are there in choice variety. The history of electric lighting is made plain, and a good many other lines of endeavor are clearly traced. The collection is one of the most valuable and interesting ever gotten up by the Museum authorities. New features are hourly being added, Chief Clerk Cox and Prof. Otis T. Mason being busily engaged in the work of direction.

Many of the objects that formed a part of this loan collection have found a place in the permanent Museum collections. Among them may be mentioned the collection of typewriters made by Messrs. Wyckoff, Seamans & Benedict, of New York, illustrating the development of the type-bar writing machine. Included among the number are the

model of the Sholes and Glidden typewriter, which was invented at Milwaukee, Wis., by C. Latham Sholes, Samuel S. Soule, and Charles Glidden in 1867. This is the model through which E. Remington & Sons, of Ilion, N. Y., first became interested in the manufacture of typewriters in 1873. One of the first machines manufactured from this model (only three having been made in 1873) is also in the collection. Parts of this mechanism were altered and modified when the present "Remington No. 1" was put upon the market. The collection also contains a model of the first typewriting machine in which double-type bar (upper and lower case type) was used, constructed in 1876. Only two or three machines were constructed before it was found desirable to make an entire change in the model. A machine somewhat similar to that now manufactured followed shortly afterward. A valuable collection of early forms of sewing machines made by the Singer Manufacturing Company of New York (from 1855 to 1891), as well as early types of the Grover & Baker, and Elias Howe machines were received from the Singer Manufacturing Company, through Mr. Henry Calver, who rendered valuable aid in the preparation of the labels. A duplicate of the original model of the Sickels lifting, tripping, and regulating machine, with Patent Office certificate and copy of drawing attached to the first patent in the world for the trip cut-off for steam engines now in general use, dated May 20, 1842, was deposited by the inventor, Mr. F. E. Sickels, of Kansas City, Mo.

A centrifugal milk separator; the first machine used in separating cream from milk at the Deerfoot Farm, Southboro, Mass., in 1879, gift of the Deerfoot Farm Company, through James Cheesman, has been added to the collection.

These and other relics of the early history of the mechanic art, previously acquired, form the nucleus of a collection which it is desired to increase in other directions.

In addition to these relics of invention the silver coffee urn, which was presented to Capt. Moses Rogers, of the steamship *Savannah*, by Lord Lynedoch, in 1819, as a memento of the first voyage across the Atlantic by steam, together with a minature likeness of Capt. Rogers made during his sojourn in Russia, have been deposited by Mrs. F. A. Seely, granddaughter of Capt. Rogers.

In addition to the accessions already enumerated, the study and exhibition series have been increased by the collection of engravings, prints, photographs, and drawings of locomotives, cars, track standards, bridges, and many original rail sections belonging to and deposited by the curator. This collection is the result of his labors during the past fifteen years in this country and during a brief visit to Europe in 1886.

In order to find space for the display of the valuable objects acquired during the year it became necessary to rearrange the whole of the exhibition series. Many objects that formerly occupied a position upon

the floor of the Museum have been installed upon brackets attached to the walls or upon the tops of cases. Notwithstanding the fact that this alternative was resorted to the floor space is overcrowded. This condition of affairs is to be lamented, since the limited space that can be assigned to this section precludes the acceptance of many objects which the owners would donate or deposit, provided they could be immediately placed upon exhibition, but which they prefer not to place in the custody of the Museum only to be kept in storage for an indefinite period.

REPORT UPON THE SECTION OF FORESTRY IN THE U. S. NATIONAL MUSEUM, 1891.

By B. E. FERNOW, *Honorary Curator.*

In view of the fact that but small space can be devoted to the exhibition of forestry collections in the Museum, no systematic effort has been made to increase the materials for such exhibit, and they are allowed to accumulate as voluntary unsolicited contributions are made. Hence the exhibits are still more or less heterogeneous and incomplete in any one direction; the object of the displays being rather to bring the existence and the diversified ramifications of the subject before the beholder than to permit an exhaustive study of any one branch.

Besides the donations received during the year, which are in part illustrations of physiological abnormities in tree growth, some of the material used by the forestry division of the Department of Agriculture in the Paris Exposition of 1889 has been installed, consisting of a display of our most important timber trees by means of maps, showing their botanical distribution, photographs of typical trees, and photomicrographs of the wood structure. This collection is by no means any more complete than the other parts of the exhibit, but gives a fair indication of what should be done when space permits expansion.

ACCESSIONS TO THE COLLECTION.

The accessions during the year are as follows:

No. 23845: Distorted white pine, coiled.

No. 23897: Girdled pine.

No. 24008: Coco de Mer—double cocoanut palm, fruit and wood, Seychelles Islands.

No. 24338: Bent wood—ash bent into the form of an evolute without showing elasticity.

No. 24337: Natural graft—two separate oaks joined by a branch.

No. 24296: Natural graft—pine branch inarched into its mother trunk.

No. 24336: Forest planting machine (model), intended for planting on the prairie without previous breaking.

No. 24335: View of Japanese cedars; a painting of an avenue of *Cryptomeria Japonica*, planted over two hundred and sixty years in Nicko, Shimotsuka, Japan.

No. 5318: Log of ebony—6 feet long, polished.

No. 24382: Argentine woods—sections of trunks.

No. 24533: Distribution charts of tree species from Tenth Census.

No. 24532: Photo-micrographs showing cross, tangential, and radial cuts of various timbers.

No. 24531: Photographs of trees, accompanying distribution charts and photo-micrographs.

No. 24700: Cypress roots and knees, showing longitudinal and cross sections.

No. 24765: Corrugated apple wood, a small section of unusual beauty.

No. 25040: Vulcanized wood; treated by the Vulcanizing (preservative) process.

Of these, a few of special interest are described on the labels as follows:

CIRCULATION OF SAP.—Section of Girdled Pine (*Pinus glabra*, Walt.).—This tree was completely girdled in its eighth year, and was injured by fire in its tenth year, yet lived and continued to deposit wood above the girdle, but none below, until cut, twenty-two years after the girdling. Gift of I. Gregor. (Jacksonville, Fla., June, 1885. 23897.)

DOUBLE COCOANUT PALM, "Coco De Mer" (*Lodoicea seychellarum*, Labil).—Fruit and wood. Seychelles Islands, Indian Ocean. 24008. Gift of W. L. Abbott.

Occurs only on two small islands of the Seychelles group in the Indian Ocean.

The trees attain a height of 100 feet, having leaves 20 feet long, 12 feet wide; five to ten nuts grow in a bunch.

Before the discovery of the trees, nuts picked up at sea led to many fabulous tales. Medicinal qualities were ascribed to the nuts and extravagant prices were paid for them.

EBONY (probably grown in Siam); from Centennial Exposition, 1876. 5318. Cubic contents, 3 feet; weight, 272 pounds.

There come into the market a number of different woods called "Ebony," highly prized for their deep black color; hard, heavy, and closely grained, and susceptible of a high polish. They are derived from various botanical families, mostly, however, from the genus Diospyrus, to which our persimmon (*Diospyrus Virginiana*) belongs.

The best ebony woods are found in India, especially Ceylon. The supplies of Diospyrus ebenum, which furnishes the best and to which the name was first applied, is almost exhausted.

The sapwood of the tree is milk-white, changing with age into black heartwood. *Diospyrus melanoxylon* now furnishes the main supply.

The ebony from Abyssinia, called "Mozzungha," is derived from a species of Fornasinia, of the Leguminosæ family.

The West Indies, French Guiana, and South Africa also supply the market with ebony woods of various qualities and shades, undetermined as to species.

The most valuable of the accessions during the year is the collection of woods of the Argentine Republic, one hundred and eleven species, a gift of the Museo de Productos Argentinos at Buenos Ayres, which was secured by Mr. J. F. Thompson. These wood-sections were accompanied by a catalogue for their identification, which in somewhat altered form, for readier reference, is given below.

As far as known to us there does not exist any complete floral work referring specially to the Argentine Republic, and certainly none on the arborescent flora.

Outside of the well-known "*Flora Brasiliensis*" of Martius (C. F. P. von) begun in 1840, still unfinished, which at least in part is applicable

to the flora of the Argentine Republic, we note the following more local or specific treatises:

TULASNE (L. R.) Legumineuses arborescentes de l'Amérique du Sud, Paris, 1844.

LORENTZ (P. G.) Vegetations Verhæltnisse der Argentinischen Republic, Buenos Ayres, 1876.

SCHNYDNER (O.) Contributions à la flore Argentine, Genève, 1877.

GRISEBACH (A.) Plantæ lorentzianæ, Gœttingen, 1874.

LORENTZ (P. G.) La vegetation del Nord Est de la prov. de Entre Rios, Buenos Ayres, 1878.

PARODI (D.) Contribuciones á la flora del Paraguay, Buenos Ayres, 1877-'9.

PARODI (D.) Notas—pl. usuales del Paraguay, Buenos Ayres, 1877.

CHRISTISON (D.) Notes on the Botany of Uruguay, 1878.

References to some of the useful trees enumerated in the list may be found also in "Ferd. v. Müller's Select Extra-Tropical Plants."

Since a reference to common names is apt to give much trouble to readers of native literature, an alphabetical table of the same is subjoined.

Alphabetical table of common names.

[The numbers refer to the current numbers of the catalogue.]

Ajicillo	(10)	Guatambú amarillo	(36)
Algarrobo negro	(52)	Guatambú blanco	(35)
Algarrobo negro	(53)	Guayabo	(64)
Ambay	(109)	Guayacan	(43)
Anchico blanco	(47)	Guayubira amarilla	(83)
Anchico colorado	(46)	Guayubira blanca	(84)
Araticu dulce	(1)	Guayubira negra	(82)
Brea	(41)	Higuera brava	(108)
Camboata blanco	(17)	Iberá-pepé	(38)
Cambuy	(69)	Ibirápiapuña	(44)
Canafistula	(39)	Ibirápuitá	(40)
Cancharana	(16)	Ibiraro	(45)
Canela de breexo	(97)	Ibiratay-mi	(13)
Canela guaica	(98)	Iguajai agrio	(65)
Caray waca	(5)	Iguajai agrio	(66)
Caroba	(88)	Iguajai dulce	(70)
Cayon de Gallo	(71)	Incienso	(33)
Cebil	(49)	Ingá	(60)
Cebil jaspeado	(48)	Itin	(42)
Cedro	(19)	Ivahée	(100)
Cedro	(20)	Lapacho amarillo	(86)
Ceibo ó curtizera	(32)	Lapacho negro	(87)
Chalchal	(24)	Lata	(92)
Cochucho	(8)	Laurel	(96)
Coco	(7)	Laurel negro	(95)
Coronillo	(23)	Laurel Sahijú	(93)
Cuentrillo	(9)	Mannelero colorado	(4)
Curupicay	(102)	Marnica de cadella negra	(11)
Espinillo	(56)	Mistol	(22)
Garrabato	(55)	Molle	(26)
Guabiroba	(63)	Molle blanco	(29)
Guaran	(85)	Molle colorado	(27)
Guamatunga blanca	(18)	Molle dulce	(31)

Alphabetical table of common names—Continued.

Mora	(107)	Québracho flojo	(99)
Naranja Amargo	(14)	Quiliu	(50)
Naranjo Amargo	(15)	Rabo de macaco blanco	(34)
Nanduby	(54)	Ramo	(25)
Nogal	(110)	Retamo	(6)
Nuati-curuzú	(72)	Samohu	(3)
Ombu	(91)	San Antonio	(74)
Pacará	(58)	Sangre de drago	(101)
Pacuri	(2)	Tala	(104)
Palo amarillo	(62)	Tala	(105)
Palo blanco	(103)	Tala	(106)
Palo de granda	(75)	Tarco	(89)
Palo de lanza	(76)	Tarumá	(90)
Palo de lanza	(77)	Tatané	(57)
Palo de lanza blanco	(73)	Tembetary-mi	(12)
Pindó	(111)	Timbó colorado	(59)
Piquillin	(21)	Timboata	(61)
Pitanga	(68)	Tipa amarilla	(37)
Quebracho blanco	(78, 79)	Vapority	(67)
Quebracho blanco	(80)	Vinal	(51)
Quebracho colorado	(28)	Zapiranguy	(81)
Quebracho colorado	(30)		

As soon as time and space permit, it is intended to work up the specimens for display and give on the labels further notes on the distribution and value of the different timbers.

It has not as yet been either possible or necessary to make much of an attempt in carrying out such a classification of forestry collections as I proposed in my first report in 1889, and a detailed report on the status of the collections seems, therefore, superfluous.

WOODS OF THE ARGENTINE REPUBLIC.

List of the specimens donated by the Museo de Productos Argentinos at Buenos Ayres.

[The numbers correspond to those used in the Argentine Museum.]

Original No.	Natural order.	Botanical name.	Vernacular name.	Locality where collected.	Height	Diameter.	Current number.
					Feet.	*Feet.*	
2398	Anonaceæ	Anona sp	Araticu dulce	Misiones	16	1+	1
1823	Guttiferæ	Platonia insignis, Mart.	Pacuri	do	20	1	2
2339	Malvaceæ	Chorisia insignis, Kth.	Samohu	Santa Fe	50	6	3
1775	do	Guazuma ulmifolia, Desf.	Mannelero colorado.	Misiones	80	3+	4
1814	do	(?)	Caray waca	do	65	2½	5
2293	Zygophyllaceæ	Bulnesia Retamo, Gv.	Retamo	San Luis	25	1½	6
2294	Rutaceæ	Zanthoxylum Coco, Gill.	Coco	do	40	2½	7
2113	do	do	Cochucho	Tucuman			8
1804	do	Zanthoxylum sp.	Cuentrillo	Misiones	30	1	9

List of the specimens donated by the Museo de Productos Argentinos at Buenos Ayres—Continued.

Original No.	Natural order.	Botanical name.	Vernacular name.	Locality where collected.	Height.	Diameter.	Current number.
					Feet.	*Feet.*	
2078	Rutaceæ	Zanthoxylum sp.	Ajicillo	Tucuman	30	1	10
1792	do	do	Marmica de cadella negra.	Misiones	50	1½	11
1714	do	do	Tembetary-mi	Santa Fe	50	2	12
1988	do	Pilocarpus sp	Ibiratay-mi	Misiones	14	½	13
2391	do	Citrus vulgaris, Risso.	Naranjo-Amargo	do	30+	1	14
2389	do	Citrus aurantium, Risso.	do	Tucuman	60	1	15
1841	Meliaceæ	Cabralea Canjerana, Mart.	Cancharana	Misiones	65	3+	16
1884	do	Guarea trichilioides, L.	Camboata blanco	do	25+	1+	17
2380	do	(?)	Guassatunga blanca.	do	30+	1+	18
1840	do	Cedrela fissilis, Vell.	Cedro	do	90+	6½	19
2008	do	Cedrela Braziliensis, St. Hil.	do	Tucuman	80+	6½	20
2009	Rhamnaceæ	Condalia liniata, Gr.	Piguillin	San Luis	20	7	21
2045 1696+	do	Zizyphus Mistol, Gr.	Mistol	Santiago del Estero.	50	1½	22
1735	do	(?)	Coronillo	Misiones	16	½	23
2118	Sapindaceæ	Allophyllus edulis, St. Hil.	Chalchal	Tucuman	40	1½	24
2000	do	Cupania vernalis, Camb.	Ramo	do	40	1½	25
2296	Anacardiaceæ	Schinris sp	Molle	San Luis	20	1	26
2297	do	Schinris latifolia, Gr.	Molle colorado	do	20	1	27
2227	do	Schinus sp	Molle blanco	Santa Fe	30+	1½	28
2128+ 2067	do	Schinopsis Lorentzii, Engelm.	Quebracho colorado.	Santiago del Estero, Tucuman.	65	4	29
1619	do	Schinopsis Balansæ, Engel.	do	do	50	4	30
2298	do	Lithræa Gilliesii, Gr.	Molle dulce	do	30+	3	31
1709	Leguminosæ	Erthrina Cristagalli, L.	Cebo ó Curtizera.	Misiones	65	3+	32
1777	do	Myrocarpus fastigiatus, Fr. Ml.	Incienso	do	80+	3+	33
1877	do	(?)	Rabo de macaco blanco.	do	65	3+	34
1791	do	(?)	Guatambii blanco.	do	50	10+	35
1837	do	(?)	Guatambii amarillo.	do	60	3+	36

List of the specimens donated by the Museo de Productos Argentinos at Buenos Ayres—Continued.

Original No.	Natural order.	Botanical name.	Vernacular name.	Locality where collected.	Height	Diameter.	Current number.
					Feet.	*Feet.*	
2079	Leguminosæ....	Machærium Tipa, Gr.	Tipa amarilla....	Tucuman.....	50	3+	37
1683	....do	Holocalyx Balansæ, Mx.	Iberá-pepé.....	Santa Fe	50	3+	38
1774	....do	Peltophorum Vogelianum, Bth.	Canafistula	Misiones	80+	9+	39
1751	....do	....do	Ibirápuitá.....	Santa Fe	.....	.....	40
2025	....do	Cæsalpina præcox, R. P.	Brea.....	Cordova	25+	½	41
2037	....do	Cæsalpina melanocarpa, Gr.	Itin.....	Santiago del Estero.	.....	.....	42
2071	....do	....do	Guayacan	Tucuman.....	50	3+	43
1786	....do	Apulsia pogomana, Fr. Ml.	Ibirápiapuña	Misiones.....	80+	3+	44
1778	....do	Pterogyne nitens, Ful.	Ibiraró	....do	60	3+	45
1782	....do	Piptadenia Angico (Aut. ?).	Anchico colorado	....do	.....	.....	46
1784	....do	(?)	Anchico blanco..	....do	65+	1½	74
2088	....do	Piptadenia Cebil, Gr.	Cebil jaspeado ...	Tucuman.....	65+	3+	48
2086	....do	....do	Cebil	(?)	.....	.....	49
2384	....do	Prosopis sp.....	Quilin	Santiago del Estero.	30+	1½	50
2043	....do	Prosopis rucifolia, Gr.	Vinal.....	....do	30+	1½	51
1588 10701+	....do	Prosopis nigro, Hieron.	Algarrobo negro.	Santa Fe	40	6	52
2069 10698+	....do	....do	....do	Santiago del Estero.	.....	.....	53
1587	....do	Prosopis Nandubey, Ltz.	Nandubey	Tucuman.....	40	3+	54
10698	....do	Mimosa Lorentzii, Gr.	Garrabato	Santiago del Estero.	20	½	55
2105	....do	Pithecolobium tortum, Mart.	Espinillo	Tucuman.....	40	1½	56
1590	....do	....do	Tatané.....	Santa Fe.....	.....	.....	57
2097	....do	Enterolobium Timbouva, Mart.	Pacará.....	Tucuman.....	100	6	58
1736	....do	....do	Timbó colorado..	Santa Fe.....	.....	.....	59
2240	....do	Inga uruguensis, Hook & Arn.	Ingé.....	....do	50	2½	60
1746	....do	(?)	Timboata.....	....do	45+	1+	61
1737	Combretaceæ ...	Faminalia sp	Palo amarillo	....do	40	2	62
1817	Myrtaceæ	Myrica sphærocarpa, Bg. (?).	Guabiroba.....	Misiones.....	65+	2½	63

List of the specimens donated by the Museo de Productos Argentinos at Buenos Ayres—Continued.

Original No.	Natural order.	Botanical name.	Vernacular name.	Locality where collected.	Height.	Diameter.	Current number.
					Feet.	*Feet.*	
1691	Myrtaceæ	Psidium guava, Raddi, von.	Guayabo	Santa Fe	20	7	64
1815	do	Eugenià edulis, Bth.	Iguajai agrio	Misiones	50	3+	65
1739	do	do	do	Santa Fe			66
1821	do	Eugenià Michelii (Aut.?).	Vapority	Misiones	40	1+	67
1831	do	Eugenià uniflora (Aut.?).	Pitanga	do	30+	1	68
1825	do	Eugenià Cambuy (Aut.?).	Cambuy	do	50	1+	69
1816	do	Eugenià sp	Iguajai dulce	do	30+	1	70
1822	do	(?)	Cayon de Gallo	do	50	1½	71
1832	do	(?)	Nuati-curruzu	do	50	1+	72
2238	Rubiaceæ	Calycophyllum multiflorum, Gr.	Palo de lanza blanco.	Santa Fe	60+	1½	73
2120	Myrsineæ	Myrsine floribunda, R. Br.	San Antonio	Tucuman	100	3+	74
2394	do	Myrsine marginata, Hook & Arn.	Palo de granada	Santa Fe	40	1½	75
1695	do	Myrsine Grisebachii, Hieron.	Palo de lanza	do	50	1½	76
2393	do	(?)	do	Misiones	20	1	77
2023	Apocynaceæ	Aspidosperma Quebracko blanco, Schl.	Quebracho blanco	Cordova	50	4	78
2388				Tucuman			79
2124		Tabernæ montana Histrix, D. C.		Santiago del Estero.			80
1677	do	Tabernæ montana Histrix, D. C.	Zapiranguy	Santa Fe	25+	1+	81
1789	Boraginaceæ	Patagonula Americana, L.	Guayubira negra	Misiones	50	3+	82
1790	do	Patagonula sp	Guayubira amarilla.	do	65+	3+	83
1862	do	do	Guayubira blanca	do	40	1½	84
2117	Bignoniaceæ	Techoma stans, Juss.	Guran	Tucuman	50	1	85
2399	do	Tabebuia flavescens, Bth. and Hook.	Lapacho amarillo.	Misiones	80+	3+	86
1769							
2236	do	do	Lapacho negro	Santa Fé			87
1809	do	Bignonia Caroba (?)	Caroba	Misiones	60	10+	88
2106	do	Jacaranda chelonia, Gr.	Tarco	do	50	3+	89
1812	Verbebaceæ	Vitex montevidensis, Cham.	Tarumà	do	50	3+	90
1852	Phytolaccaceæ	Phytolacca doica.	Ombú	do	25+	10+	91
2109	Piperaceæ	Piper Sieberi, C. D. C.	Lata	Tucuman	15+	½	92

List of the specimens donated by the Museo de Productos Argentinos at Buenos Ayres—Continued.

Original No.	Natural order.	Botanical name.	Vernacular name.	Locality where collected.	Height	Diameter.	Current number.
					Feet.	*Feet.*	
1743	Laurineæ	Ocotea suaveolens, Gr.	Laurel Sahijú	Santa Fé	60	3+	93
1870	do	Ocotea sp	Laurel amarillo	Misiones	60	3+	94
2396	do	Nectandra porphyria, Gr.	Laurel negro	do	65+	3+	95
2107	do	do	Laurel	Tucuman			96
1826	do	(?)	Canda de bresxo	Misiones	65+	2½	97
2017	do	(?)	Canda guaicá	do	65+	2½	98
2024	Santalaceæ	Jodina rhombifolia, H. and A.	Quebracho flojo	Cordova	35+	1+	99
1697	do	Acanthosyris spinescens, Gr.	Ivahée	Santa Fe	25+	1½	100
1747	Euphorbiaceæ	Croton sucirubens, Pdi.	Sangre de drago	do	25+	1+	101
2393	do	Sapium aucuparium, Jacq., var.	Curupicay	Misiones	50	1½	102
1875	do	Sebastiana sp.	Palo blanco	do	40	1+	103
2395	Urticaceæ	Celtis Tala, Gill. var. Gilliesii.	Tala	do	25+	⅝	104
2027	do	do	do	Santiago del Estero.	25+	⅝	105
2068	do	Celtis Sellowiana, Mi.	do	do	50	1½	106
1801	do	Maclura Mora, Gr.	Mora	Misiones	60	2½	107
1806	do	Ficus subtriplinerva, Mart.	Higuera brava	do	50+	4+	108
1807	do	Cecropia peltata, Gr.	Ambay	do	30+	1+	109
2119	Juglandaceæ	Juglans australis, Gr.	Nogal	Tucuman	45+	6+	110
1847	Palmaceæ	Cocos australis, Mart.	Pindó	Misiones	50+	1+	111

REPORT ON THE SECTION OF MATERIA MEDICA IN THE U. S. NATIONAL MUSEUM, 1891.

By JAMES M. FLINT, U. S. NAVY, *Honorary Curator.*

Since the last report from this section was written, the work of arranging, displaying, and providing with descriptive labels the large number of specimens comprising the exhibit has been systematically continued. With the exception of the small collection of medicines of the North American Indians, and the Chinese and Japanese drugs, every specimen of drug has now its printed descriptive label attached. In addition to these, of the 862 illustrations of plants and animals in the exhibit, 350 have their descriptive labels in place, 460 are printed and ready for display, and the manuscript for the remainder is in the hands of the printer.

Accessions to the number of 169 have been received during the year, mostly from Messrs. Powers & Weightman, of Philadelphia, and Parke, Davis & Co., of Detroit, in answer to requests for specified articles to fill vacancies. Some novel and interesting additions have been made to the botanical illustrations, consisting of herbarium specimens of indigenous medicinal plants, not otherwise illustrated, with the characters of each plant displayed by drawings of the magnified organs. These were prepared with great skill by Mr. Theodore Holm, temporary assistant in this section. As mounted in the swinging frames, they make an attractive addition to the collection. One hundred and two photographs of indigenous plants have also been mounted, and the descriptive labels prepared and printed.

The collection remains without material change in condition, location, classification, or arrangement since the last report. The accessions above mentioned were distributed principally among the "chemical products" and the "indigenous vegetable products."

The following summary shows the number of specimens in each series:

Exhibition series	3,335
Reserve series	1,223
Duplicate series	815

Illustrations:		
Colored plates	662	
Photographs	102	
Herbarium specimens	60	
Micrographs	38	
		862
		6,235
Last catalogue entry in June, 1890		142,056
Last catalogue entry in June, 1891		142,225

It is proper to say, in explanation of the fact that the total number of specimens does not balance with the sum of the accessions for the year and the total of the previous year's report, that some of the accessions prove to be triplicates and are absorbed in the duplicate list, that a small percentage of specimens is every year rejected as worthless, either originally or by unavoidable deterioration, and that the illustrations are not entered in the catalogue.

REPORT ON THE SECTION OF PHYSICAL APPARATUS IN THE U. S. NATIONAL MUSEUM, 1891.

By W. C. WINLOCK, *Honorary Curator.*

The collection of physical apparatus, consisting chiefly of pieces procured by Prof. Henry for researches in electricity and sound, was stored, when first placed in my charge, in the laboratory rooms on the third story of the east wing of the Smithsonian Institution. In April, 1890, all of the apparatus was placed, by the direction of the Secretary, though without much systematic arrangement, in cases in the south entrance of the building.

The pressure of other official duties has prevented me from devoting the time necessary to catalogue this apparatus in a thorough manner, though some progress has been made in laying out the work, and it is hoped that an opportunity will soon be found to separate the pieces that are of interest as Museum specimens from those that should be placed in storage.

A careful distinction is made between the apparatus which is intended for exhibition and that purchased for use in connection with the astrophysical observatory and for other experimental purposes.

The curator hopes that with a little clerical assistance it will be possible to draw up a complete inventory of all the apparatus under his care.

The principal accessions to the Museum apparatus are a collection of ancient watch movements, made by the Secretary, Mr. S. P. Langley, during a visit to London and Paris in the summer of 1890. These have been labeled and exhibited, together with several ancient dials and an interesting astrolabe, under the immediate care of Prof. Mason. Prof. Mason has added a few watches that have been held in his own department.

A collection of old surveying instruments has been received from the surveyor-general of Florida through the Department of the Interior. It is supposed that these instruments were used by Andrew Ellicott, esq., the commissioner, on the part of the United States, in laying the boundary line between Florida and Georgia in the year 1795 in conjunction with the Spanish commissioner, Capt. Minot.

A set of bronze weights and the works of an ancient clock, purchased in Spain at the request of Secretary Langley by Col. F. A. Seely, of the United States Patent Office, have also been received.

REPORT ON THE DEPARTMENT OF PREHISTORIC ANTHROPOLOGY IN THE U. S. NATIONAL MUSEUM, 1891.

By THOMAS WILSON, *Curator.*

A general review of the work of the department for the year covered by this report, will compare favorably with that of the year previous.

The last half of the fiscal year was employed in the new classification and arrangement of the collection. The changing of cases necessary upon the removal and grouping of the Pueblo models in the west end of the hall, the establishing of new synoptical cases, the classification of arrow or spear-heads or knives, and the entire rearrangement of specimens according to geographic locality are some of the differences between the work of this and former years.

During the past year we have been engaged in making series of plaster casts of typical specimens of stone implements, sufficient to make one hundred sets, each containing one hundred casts, for distribution among educational institutions. About fifty sets have been completed during the fiscal year.

I completed during the past fiscal year the report of my visit to Paris and the French Exposition, and of my attendance as a delegate to the International Congresses of Anthropology and Prehistoric Archæology, of Criminal Anthropology, of Hygiene and Demography, and of the French Association for the Advancement of Science; as well as my investigations into the Prehistoric Museums of France. The part relating to Anthropology at the French Exposition is to be published in the Annual Report of the U. S. National Museum, 1890; that on Criminal Anthropology in the Annual Report of the Smithsonian Institution, 1890. My report on the International Congress of Hygiene and Demography was published in the report of the Commissioners of the District of Columbia for 1890, and that of the International Congress of Anthropology and Prehistoric Archæology appeared in serial form in the American Naturalist, 1891–'92.

IMPORTANT ACCESSIONS RECEIVED DURING THE YEAR.

THE MOOREHEAD COLLECTION OF ABORIGINAL RELICS, comprising many beautiful specimens, from Warren County, Ohio. In this collection will be found chipped flint objects (such as arrow and spear points), polished hatchets, grooved axes, pestles, discoidal stones, a large number of ceremonial objects, carved stone

pipes, implements and ornaments of copper, hematite, and galena, bone and shell beads, and clay vessels—about five hundred specimens in all. The collection is of great value from the fact that it is the result of one person's (Mr. Simonton) endeavors for over twenty years, is all from one county, and the genuineness of the objects can not be disputed. (Acc. 23543). Deposited by Warren K. Moorehead, of Xenia, Ohio.

O. N. BRYAN (Marshall Hall, Charles County, Md.), who died July 11, 1890, bequeathed his collection of one hundred and sixty-four specimens of rude quartzite implements (some notched), arrow and spear points of quartzite, argillite, and jasper, pierced tablet, stone slabs with mortar-like cavities, fragment of a potstone vessel and fragments of pottery; from the vicinity of Marshall Hall. (Acc. 23379.)

FREDERICK S. PERKINS (Madison, Wis.): A collection of prehistoric copper and galena objects, 422 in number. The larger number of implements are from Wisconsin, but Ohio, Illinois, New York, and West Virginia are represented. The objects of galena are all from Ohio. (Purchase.) (Acc. 23617.)

Dr. HILBORN T. CRESSON (Philadelphia, Pa.): A collection of 536 specimens, including rude chipped implements, quartzite and argillite (Paleolithic), arrow and spear heads, scrapers, knives, etc., pieces of bone and charred wood, 372 specimens; and fragments of pottery; from a rock shelter at Claymont, Del. Also, small rude chipped implements and flakes, principally of quartzite and argillite, charred wood and fragments of pottery found while digging a well on Christiana Creek, Delaware, in the year 1848; 4 rude chipped implements of quartz and quartzite (paleolithic type), and 15 fragments of human bones from the surface of the marshes at the mouth of Christiana River, Delaware; jar containing charcoal and ashes from a cave in Chelsea, Pa.; 56 small, rude implements, and flakes, mostly of quartzite, from Chickies Cave, Lancaster, Pa.; leaf-shaped implements and 8 arrow heads from Chester, Pa.; flint scraper, arrow head, and a fragment of a ceremonial object from Lancaster County, Pa.; 55 leaf-shaped argillite implements from the valley of the Delaware River; carved stone pipe and two small rude flint implements from a cave in east Tennessee. (Deposit.) (Acc. 24318.)

Dr. HILBORN T. CRESSON (Philadelphia, Pa): A collection of 1,383 archæological objects from dredging stations A, B, and C, at the mouth of Naaman Creek, Delaware. (Deposit.) (Acc. 23766.)

From Dredging Station A.—Arrow and spear points of argillite, etc.; rude quartzite flakes; spear point or knife; grooved sinkers.

From Dredging Station B.—Grooved axes (one broken); fragments of polished hatchet; arrow and spear points; rude points; chips, flakes and broken points of quartzite, etc.; fragments of drilled ceremonial object; fragments of pottery; fragments of pile ends charred by fire; fragment of one of the wooden structures; grooved sinkers; oval-shaped implement of jasper; oval-shaped implement of argillite; human skull.

From Dredging Station C.—Broken knives, arrow and spear points of quartz, quartzite, jasper, etc.; arrow and spear points of argillite; large spear head of argillite; grooved sinkers; fragments of shell and bone; fragments of turtle shell; pottery, bone, charcoal (charred end of stake); chips, flakes and broken points of argillite, quartz and quartzite dredged.

Prof. E. D. COPE (University of Pennsylvania, Philadelphia, Pa.): Two leaf-shaped obsidian implements from the Equus beds of Fossil Lake, Oregon. (Gift.) (Acc. 24358.)

Prof. H. W. HAYNES (Boston, Mass.): Six rude pieces of quartz (implements?), from Lisbon, Dublin, and Franconia, New Hampshire, and North Quincy, Mass.; and 14 flint implements (paleolithic) from Egypt. These specimens (20 in number) are lent to the Museum for one year. (Acc. 23863.)

Mrs. Gen. J. H. BAXTER (Washington, D. C.): Thirty-seven specimens of ancient Peruvian pottery collected by William Tryon, and sent to Gen. J. H. Baxter, Surgeon-General U. S. Army. These specimens are deposited in the Museum with the request that they be labeled and known as the "Tryon collection." (Gift.) (Acc. 24195.)

THOMAS HERRAN (Hamburg, Germany): Nine gold ornaments from ancient Indian graves in the province of Antioquia, United States of Colombia. (Purchased.) (Acc. 23661.)

Capt. JOHN G. BOURKE, Third Cavalry, U. S. Army (Washington, D. C.): A collection of 64 specimens of archæological objects from cliff ruins and pueblos in Arizona and New Mexico. (Gift.) (Acc. 24169.)

Dr. WASHINGTON MATTHEWS (Army Medical Museum, Washington, D. C.): Five packages of dyed wool of the Navajo sheep, and three packages of dye stuffs used by the Navajo Indians of New Mexico and Arizona, and illustrative of his paper on Navajo weaving, American Anthropologist. (Gift.) (Acc. 24191.)

GEORGE B. FRAZAR (West Medford, Mass.): Collection of 65 rude chipped implements (Chelleèn type), 22 rude knives and points, 15 leaf-shaped implements (more or less broken), 8 arrow points, and 8 chips and flakes. There were also received 25 rude chipped implements, and 10 rude knives and points of white quartz, 4 hammerstones and a fragment of a polished stone hatchet, from Blackman's farm, Blackman's Point, at the mouth of Cut River, Marshfield, Mass. (Gift.) (Acc. 23756.)

Dr. F. H. GOODWIN (Tucson, Ariz.): A carved stone placque which was taken from an old Indian grave on the bluff bank of the San Pedro River, in Cochise County, Ariz. (Gift.) (Acc. 24231.)

Dr. CHARLES M. STUBBS (Wakefield, Pa.): Nineteen stone "picks" used in the manufacture of potstone vessels "by the Shawnee Indians," and 5 fragments of potstone vessels, found near Wakefield, Lancaster County, Pa. (Gift.) (Acc. 23752.)

R. M. BARTLEMAN (Secretary of legation, United States of America, Caracas, Venezuela): A small pottery vase found while excavating for phosphate in what had been a fissure, but now filled to a depth of about 30 feet, on the island of Gran Roque, 60 miles north from the coast of Venezuela. Also a stone implement or ornament from a cave in the Cordilleras of Merida, Venezuela; a small painted stone hatchet and 2 stone chisels (?) from Venezuela, exact locality not stated. (Gift.) (Acc. 23968.)

Prof. I. C. RUSSELL (U. S. Geological Survey, Washington, D. C.): Two stone mortars (ornamented with rude carvings) used for grinding tobacco and also as a lamp; a stone adze, and a rude pointed stone implement of unknown use, from Yukatat, Alaska. (Gift.) (Acc. 23735.)

HALBERT RUST (Jeffersonville, Clarke County, Ind.): A collection from an Indian burial place near Clarkesville, Clarke County, Ind. Human bones more or less broken (parts of skull, leg, arm, feet, hand, and vertebræ). Iron stone nodule found at the head of the skeleton; a small piece of worked bone found with the feet bones; a jar containing portions of the material surrounding and overlying the body; subsoil, soil, charcoal, ashes, shells, flint chips, limestone, bones, "lucky stones," etc.; a flint hammerstone, a stone sinker, 13 bone awls, bone fishhook, 6 fragments of worked bone, and 14 fragments of pottery; all from the immediate vicinity of the burial place. (Gift.) (Acc. 24332.)

GEORGE R. MERRILL (Grand Rapids, Mich.): A human skull (Indian) with three holes one-fourth inch in diameter, one-half inch apart, drilled in the top. Each is countersunk. Found two miles west of the city hall, in Detroit, Mich. Also one perforated and two unperforated skulls, apparently those of squaws. With these skulls were found bones heaped *en masse*, some of which were wanting, indicating that at some time they had been reburied. (Gift.)

BYRON E. DODGE (Richfield, Genesee County, Mich.): A stone hatchet with handle of wood, found in Genesee County, Mich. Also, a spearhead of agate and a catlinite pipe from same locality. (Deposit.) (Acc. 24272.)

EDWARD T. INGRAM (Marshalltown, Pa.): Sixty-one leaf-shaped implements of argillite, found *en cache* in Chester County, Pa. These are a valuable contribution to our display, and have been arranged as found and the cache reproduced. (Gift.) (Acc. 24026.)

JOHN G. WEBB (Osprey, Manatee County, Fla.): Fragment of a human skull turned to limonite, found in 1868 on section 3, township 37 S., range 18 E., Little Sarasota Bay, Florida. (Gift.) (Acc. 24115.)

JOHN G. WEBB (Osprey, Manatee County, Fla.): Two pieces of sandstone rock containing fossil human bones; vertebræ and ribs, found on section 10, township 37 S., range 18 E., Little Sarasota Bay, Florida. (Gift.) (Acc. 23727.)

JOSEPH WILCOX (Philadelphia, Pa.): Fossil human bone, socket of femur inclosed in limonite, found in 1886 by Col. Wilcox and Prof. Heilprin on section 6, township 36 S., range 18 E., on Sarasota Bay, Florida. (Gift.) (Acc. 24357.)

G. G. B. GREENWOOD (Minerva Ohio): A mortar made from a sandstone bowlder found by W. R. Tarbet in the Canal Dover gravel pit, glacial moraine, Tuscarawas County, Ohio. (Gift.) Acc. 23497.)

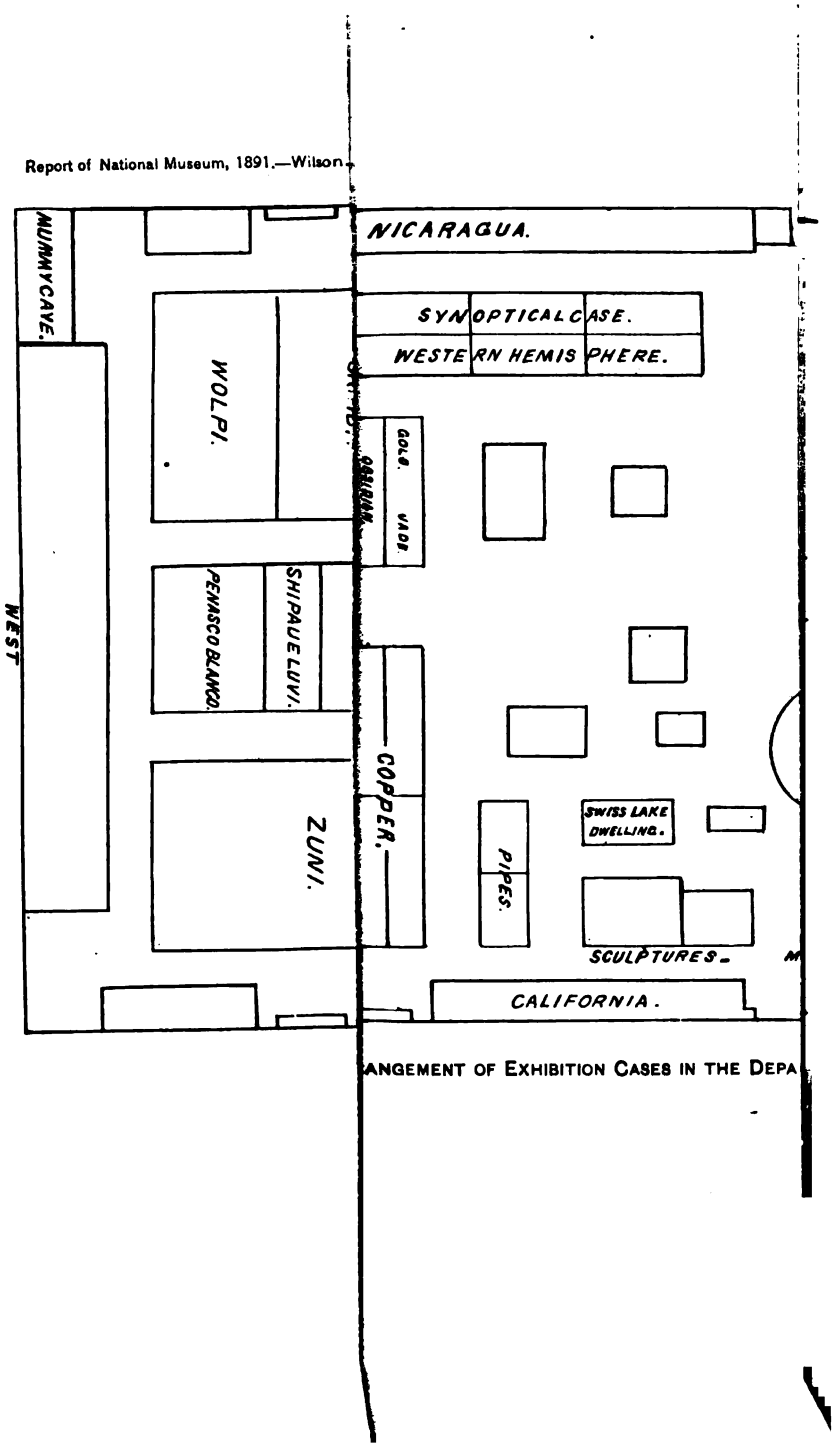
STATEMENT OF CHARACTER OF ROUTINE WORK, CLASSIFICATION AND ARRANGEMENT OF COLLECTION, ETC.

The routine work has been of much the same character as in former years. It consists primarily of the receipt of specimens, their classification, naming, numbering, entering in the catalogue with accession and catalogue numbers, and marking the number of each specimen, and, on a considerable portion of them, the locality and donor's name. The entering of them in the catalogue books requires also the recording of all information received or obtainable from the senders, and finally the distribution of the objects in their proper cases.

The collections, as displayed in the cases of the grand hall, have to be rearranged according as new specimens are received. Monthly reports and reports upon letters and objects sent for examination, the giving of information, answering of letters, conducting friends and visitors through the Museum, and explaining the objects to them—these are the other portions of routine work, and they are more than sufficient to occupy office hours. There have been almost a thousand reports and letters written during the year, consuming nigh six thousand pages of type-written matter, the principal portion of which was dictated into the phonograph by the curator at his home out of office hours.

Some years ago the curator prepared and submitted to the Director of the National Museum a proposition for a new classification and rearrangement of the departmental collection. The previous arrangement was according to function; that is, all objects, from whatever locality, were placed together, as grooved axes together, stone hatchets together, and so of all kinds of arrow and spear-heads, knives, scrapers, etc.

This I proposed to abandon, and to substitute for it an arrangement according to locality, all objects of whatever nature from a given locality to be displayed together.



ANGEMENT OF EXHIBITION CASES IN THE DEPA

Primarily this division would be by States and Territories, then by such interior localities as might be found practicable, but with an inflexible rule that objects from a given cemetery, grave, mound, earthwork, or other monument should be kept together. There are but two exceptions to this arrangement. Some specimens have been taken out of the spaces assigned to their localities to serve in the synoptical cases. Some others are banner-stones, bird and beast shaped, the function of which is unknown. The copper objects have been taken out and grouped together, but they have all been replaced in their localities with representative drawings. In April of last year the order was received to carry this scheme of classification into effect. The arranged cases had to be entirely changed, and every movable case on the floor placed in a new position. The trays in each case had to be changed as well as a large proportion of the objects in each tray. As the specimens in my department number in the neighborhood of 160,000, it will be seen that this work involved no small labor, and almost the entire latter half of the fiscal year was consumed in its performance. It was done in great hurry in preparing for the meetings of the scientific societies and congresses which were to be held in August and September, 1891, in Washington City. It required the services of the entire force of the department to the neglect of routine duty, and was barely completed in time. In the haste consequent upon this, there will be found a necessity for a continuation of the work in further re-arrangement and classification, and in the preparation of new labels. If the science of prehistoric anthropology were well known and firmly determined, it would not be difficult to effect these new arrangements and write the new labels, but everything is so strange that one has to proceed carefully and step by step, as in working out a new invention.

The main body of the hall is occupied by these different cases—tall uprights, slope-topped, and flat-topped cases—which contain the objects belonging to the neolithic period of the United States, divided according to States and Territories.

A diagram of hall with localities indicated is here presented (Plate I). The States are not arranged according to sequence, as it was difficult to do so. This difficulty will be apparent after a moment's consideration. While the New England and Middle States will follow in regular sequence, yet, on arriving at Pennsylvania and Maryland, the line may branch off to the west and go through Ohio, Indiana, Illinois, or go south through Maryland, Virginia, and the Carolinas. Tennessee and Kentucky belong, of course, together, but they join equally Ohio, Indiana, and Illinois on the north, Virginia and the Carolinas on the east, Georgia, Alabama, and Mississippi on the south, and Missouri and Arkansas on the west. They can not be put in juxtaposition with all these mentioned, and therefore sacrifices must be made. The same is true of other States, which will be apparent without being mentioned. The exigencies of display arising from the different kinds of cases and

their positions only added to this difficulty, and it was evaded or accomplished by concession on the one hand or the other so as finally to make the best display possible.

This new classification and arrangement of the department is such a departure from former procedures as to justify a few sentences of explanation. The arrangement in former times was to exhibit all objects of one kind together, classifying them according to function, as has been described. This classification undoubtedly served a good purpose in its beginning, but it had wrought out that purpose, and Dr. Rau declares in his last report (Smithsonian Annual Report for 1886, p. 111), that the collection would be ultimately arranged geographically. Such, therefore, was his intention at the time of his death, and I do but carry it out.

His conclusion and the present action are correct on principle. All museums other than prehistoric, proceed upon a different basis, with a different method of education, and are in pursuit of a different object (from the prehistoric). In the historic museum the objects displayed are after the fashion of illustrations in a book. They are only used as descriptive of the particular branch of art, science, or civilization to which they belong. They have nothing, or but little, primarily to do with the history of the people who made or used them. That history is given in books and in the descriptions of travelers and visitors. The books contain the text of the history, while the objects displayed in the museums are the illustrations of the various branches to which they belong. Not so in a prehistoric museum. While the objects displayed also serve as illustrations and are to be studied for their own sake, in order to determine their origin, mode of manufacture, use and the various improvements that may have been made in all these regards, yet none of these have the primary idea on which the prehistoric museum is based. The objects belong to a prehistoric age and have no history, or but little. They were made and used by a people of whose origin, migration, government, manners, habits, customs, civilization, we have no history. The articles or objects displayed in the prehistoric museum, when viewed in connection with their discovery, association, and strata of superposition form the only basis of knowledge we have of the people. These articles are at once the texts of the history as well as its illustrations.

In historic museums we study the object displayed; in the prehistoric museum we rather study the man who made the object, and therefore the necessity of having all his relics and remains assembled together. Thus will be shown, side by side and at a glance, all the paraphernalia of a tribe or the occupants of a given locality, whether the objects be for use in war, the chase, agriculture, domestic and home life, ceremony, religion, medicine, or what not. These, together with man's remains as found in his graves and tombs, and the monuments he has left form all our sources of knowledge concerning him. To properly study the

man in all his phases and to become acquainted with his history, it is necessary that we combine and study together all these things. For this reason the arrangement and classification of a prehistoric museum should be geographical, and according to locality rather than according to function; and so it has been made.

The Pueblo models which formerly were in irregular and unsuitable places in the center of the hall, have been grouped at its west end, laid out and arranged as shown in Plate I. I respectfully report that the improvement in their appearance and the attraction and interest they have for the public is so great that I will not attempt to describe it. Each individual model is a work of art, and it represents, as nothing else can, the real objects. When these are grouped, as they now are, in a harmonious and homogeneous arrangement, with the relief map to serve as a guide and indicator, by which the relative position of the various pueblos may be easily understood, it may be seen how great is the improvement. When the industrial objects from these pueblos shall be assembled so that one can view in juxtaposition the countries they occupy, the towns and houses peopled with the representations or reproductions of the Indians who were their actual occupants, represented in life size and clothed with their original garments, their household utensils, their thousands of pieces of pottery, their hundreds of textile fabrics, their objects of ceremony, the sacred blankets, the medicine man's outfit, and all the objects which figure to such an extent in the grand ceremonial dances, the rain and prey gods, all of which we possess in the Museum in such numbers and of such importance: When to these are added the magnificent photographic transparencies now shown in the lecture hall of the National Museum, the result will not be excelled by any other unit display in any museum in the world. I congratulate myself upon having done in this year's work what I could to obtain the excellence of that portion of this display which belongs to my department, and the pueblo room in the west end of the hall is proving an increased attraction to the public.

The pueblo models are arranged in three rows, each one grouped together with aisles on all four sides, convenient for their inspection. They occupy the entire width of the hall (48 feet and a depth of 33 feet, area, 1,584 square feet, including aisles), and are separated from the main body of the hall by upright alcove cases, giving it the appearance of a separate room, which is indicated by a sign overhead "Pueblos." They are so arranged as to present their most favorable view on entering. The models in front are of lower altitude (29 inches) while those in the rear are banked each one higher, until the farthest is 45 inches in height; thus they make the most attractive display possible.

The pueblo of Zuñi, New Mexico (20 by 12 feet), is on the south, and from its great size nearly fills the row. In its front is Montezuma Well, Arizona (4 by 5 feet), We-ji-gi, Chaco Cañon, New Mexico; Tegua, Arizona (4.2 by 2.3 feet).

The center row is arranged as follows: Relief map of Tusayan, Arizona, 7 by 9 feet; Shimopavi, Arizona, 5 by 9 feet; Mishonivi, Arizona, 5 by 9 feet; Shipaneluvi, Arizona, 6.4 by 9 feet; Penasco Blanco, Arizona, 7.6 by 9 feet.

The north row is arranged as follows: Sechomovi, Arizona, 3.6 by 8.5 feet; Acoma, New Mexico, 3.1 by 3.8 feet; Tewa, Arizona, 5 by 8.5 feet; Taos, New Mexico, 3.6 by 3.10 feet; Oraibi, Arizona, 9.9 by 13 feet; Wolpi, Arizona, 5.6 by 14.9 feet.

The smaller models are placed in alcoves and windowseats and on tops of cases. They are as follows: Mummy Cave, a cliff ruin in Cañon del Muerte, Arizona; Cliff Ruin, valley of Rio de Chelly, Arizona; Cliff Fortress, Beaver Creek, Arizona; Cliff Ruin, Rio Mancos, Colorado; Cliff Ruin, Cañon de Chelly, Arizona; Cave town, from the cliffs of Rio de Chelly, Arizona; restoration of same; Pueblo Bonita (restoration), Chaco Cañon, New Mexico; Ruin of Small Pueblo, near Pueblo Alto, Chaco Cañon, New Mexico; Cliff Ruin, Casa Blanca (White House), Cañon de Chelly, Arizona; Ruined Tower, McElmo Creek, Rio San Juan, Colorado.

Framed labels have been prepared, giving full description and placed on or against each model. Maps of the region are at the entrance, hinged to the first case, so they can be placed in position for study when needed, and when not, can be let down out of the way.

The original objects belonging to these models have been and will be placed in the cases around the walls, so that the entire archæological discoveries from each locality can be seen at a glance, and compared with themselves and with each other, according to the desire of the visitor.

The occupation of this space at the west end of the hall by the pueblos necessitated a vacation of the various cases which had stood there. They were pushed farther to the east and now form the boundary of the pueblo room. This demanded rearrangement of the cases within the room, and all of them had to be moved in some way or other. The necessity for this change was increased by the order given by the Director on my recommendation removing the 14 temporary tables with legs. They had been made of soft wood, originally for use in some exposition. They are now being replaced by cases inclosed, containing drawers for the storage of material, the first we have had for such a purpose. This is a great improvement. I have endeavored to group the objects from different countries together, and to so employ the taller upright cases as to divide these countries as by screens, which will be apparent to the eye and so form the semblance of a room or chamber adapted to each country.

The room at the extreme east of the hall is devoted to European prehistoric objects. In the line of wall-cases along the north side of the hall are displayed the objects from Mexico, Central and South America. In the foyer in the center of the hall, used as an entrance, are dis-

played special objects which, owing to their size and condition, could not be properly displayed elsewhere.

The first display seen on entering is in the synoptical cases, which are arranged geographically, chronologically, and in sequence; on the left are six cases representing the prehistoric anthropology of the eastern hemisphere, so far as we have objects for that purpose. The first two cases are occupied with the first epoch of the Stone Age, which has been called different names by different scientists corresponding to the Chelleèn Epoch of de Mortillet, the Cave Bear of Lartet, the Mammoth of Dupont, and the Alluvium of Solomon Reinach. I have divided this epoch according to the localities from which the various objects displayed have come. England is first represented, and the divisions are made into southeast and southwest of that country; France is represented in divisions showing the northern, central, eastern, the southern, the central western, and the northwestern; Spain, Portugal, and Italy have representatives; Africa has a most excellent representation lent to us by Prof. Henry W. Haynes, of Boston, who was the original discoverer, and here are displayed many of the original implements found by him described and figured in his monograph entitled "Discovery of Paleolithic Flint Implements in Upper Egypt." (Mem. Amer. Acad., vol. x, Boston, 1881.) For this discovery Prof. Haynes was awarded a bronze medal by the French Exposition of 1878, where he made the first announcement of his discovery and his display of the objects. Asia is represented by specimens from the laterite beds near Madras. Each of these displays is accompanied by a map of the country on which is marked the locality from which the objects come. There is displayed in this synoptical case outline drawings of the various human skulls found in different parts of Europe, belonging to the quaternary geologic formation, supposed to be here represented, and along with them reproductions and restorations of the various extinct animals believed to have been contemporaneous with the man of that epoch.

The succeeding epoch, that of the caverns according to the nomenclature of M. Reinach, the reindeer of Dupont and Lartet, and that of Moustier, Solutrè, and Madeline of de Mortillet, is in two cases somewhat similarly divided, although the evidences of that epoch have not been found so widely distributed as the former. Here are to be found the first improvement in industry and art, the fine chipping of the Solutreèn leaf-shaped implement, the long flakes used as knives or saws, the round-ended scraper, the flint graver, and the bone points, harpoons, and needles. During this epoch these make their first appearance in the civilization of the world. Along with them are displayed the most important specimens of the three or four hundred objects of art work which have been found principally in the caverns of France, showing the artistic capabilities of the paleolithic man of this epoch. These specimens are necessarily all casts, the originals not being obtainable. The British Museum has lately purchased the collection made by Mon-

sieur Peccadeau de l'Isle, of Toulouse, for which the latter gentleman asked in my presence the sum of $8,000.

The other two cases of foreign countries contain the display of the Polished Stone Age and the Bronze Age.

This case is but a synopsis and contains only a small proportion of the specimens we possess, and which are shown in the proper part of the Museum.

Upon the right-hand side of the entrance, the direction indicated by arrows, is the same synoptical display made from America. First, the extinct animals belonging to the quaternary geological period, and along with them a representative paleolithic implement from each state of the United States in which they have been found. Adjoining this is a sample of the discovery of Dr. Cresson at Claymont, Del., in a rock-shelter, the lower strata of which represents paleolithic, and superimposed are the various layers of subsequent human occupation, ending with that of the Indian as represented by his arrow heads and other common implements. The other objects from America need not be mentioned, but they are such as are commonly seen in collections, one or two of each having been taken out of their cases, the object being to form a synopsis of the department.

In the last case on this side is an attempt at classification and arrangement of the arrow or spear-heads or knives, which will be mentioned further on.

The rest of the foyer is filled with objects which, from their great size or other conditions, can not be conveniently displayed in cases with their respective localities: The Sacrificial Stone, Cuanhaialli of Tizoc from Mexico; Chac-Mool, the statue from Yucatan; the carved entrance to the Palace of Palenque; the largest and finest metates from Mexico and Central America; a large cupstone weighing about 250 pounds, containing fifty-three cups upon its one side, from Wheeling, W. Va.; casts of grinding stones from Rhode Island, taken from and forming part of the original rock in place, which could not itself be moved; wooden coffins and cedar ladder belonging to and found in the caverns which were occupied by aboriginal people in northern Alabama, and the display of the series of coins from the British Museum, beginning at 700 B. C. and coming to the first century A. D.

The hall is 200 feet east and west by 50 feet north and south. Its total area, counting by outside lines, is 10,000 square feet. Its utilized area is 13,507 square feet. But we have done better than this. Under the present arrangement, the exhibition space has been increased from 5,604 to 8,183 square feet, the space occupied by the pueblo models has been reduced from 1,750 to 1,584 square feet, including passage ways. The aisle space has been reduced by some thousand feet, and the space at the entrance has been much increased. Thus it will be perceived that the rearrangement has been a gain in every way, an increase in exhibition space, a decrease in aisle space, and a vast improvement in artistic appearance and scientific utility.

The increase in drawer space, by means of the seven new table cases, is such an improvement and convenience tht words fail to describe it. I am promised that the other seven will be completed within the current year.

I have prepared a table showing the arrangement of cases and the amount of space gained for exhibition purposes. Accompanying it is a section (here presented,) showing the arrangement of shelves in one of the upright alcove cases by which it will be seen that sloping shelves have been so arranged that 8 square feet of exhibition area is obtained from one running foot of each case, and every object in plain sight.

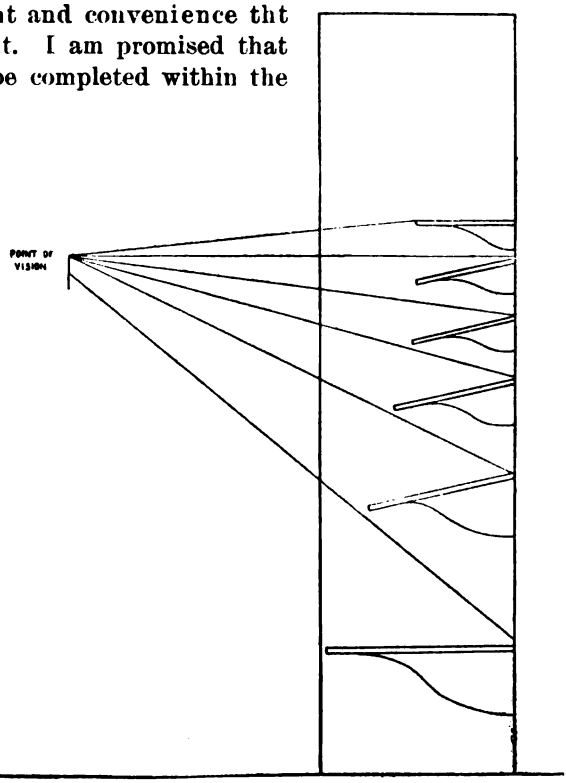


DIAGRAM 1.—Section of upright alcove case, showing arrangement of shelves without interference of view.

STATEMENT OF ARRANGEMENT OF CASES AND AMOUNT OF EXHIBITION SPACE.

Fifty-seven wall cases, 10 feet high, 2 feet 8 inches deep, and 300 feet 6 inches running measure. Space area, 800 square feet. Seven shelves make additional square feet, and with the top used for exhibition purposes make 8; 300: 6″x10, averaging 10 feet to each running foot, 3,000.

Seventeen double upright alcove cases, 7 feet 10 inches high, 9 feet 2 inches long, 4 feet 9 inches deep. Total floor space, 1,498 square feet. One hundred and fifty-five feet of running measure of six shelves area in each side of each, twelve in all, 16 feet area to each running foot of case, 2,480.

Twenty-one single table cases, 9 feet 2 by 2 feet 6, 23 feet 10 inches area for each case. Total area for 21 cases, 500 square feet. Exhibition space underneath, 500.

Twelve single table cases, 7 by 2.5. Seventeen feet area for each case. Total area for 12 cases, 204 square feet. Exhibition space underneath, 204.

Three mahogany cases, 8 feet 10 by 2 feet 10 inches, 25 feet area for each case; total for 3 cases, 75.

Eight double table cases, 9 feet 2 by 4 feet 6 inches, 41 feet area for each case; total area for 8 cases, 328. Exhibition space underneath, 328.

Fourteen double table cases, same superfice, 41 feet area for each case; total for fourteen cases, 574. The bottom of these are intended for drawers, and not for exhibition. Seven new cases were made during the year.

Seven more are required; when they are completed, we will be well provided with drawer space. This was much needed, for we were before practically without such space.

The space now occupied by exhibition cases is		8,183
Pueblo models		1,584
Twenty-one window spaces filled with radiators and Central American sculpture		378
		10,145
Center space filled with statues, models, etc		1,150
Total used for exhibition		11,295
Aisles	1,582	
Entrance	794	2,376
		13,671

REVIEW OF SPECIAL RESEARCHES PROSECUTED UPON MATERIAL BELONGING TO THE DEPARTMENT.

In the matter of special researches belonging to the department, the year commenced with fine promise, but was interrupted by the work of classification and rearrangement before referred to. However, something not entirely insignificant was done under this head, and the work of classification and rearrangement was an assistance and aid in some regard in this direction. The classification of copper implements incident to the Perkins collection led to special researches in that regard, which are not concluded. The research into these copper implements developed the possible fact that while Wisconsin and Michigan are the richest States in copper implements, and contain the most celebrated copper mines in the eastern United States supposed to have been wrought in prehistoric times, yet this collection shows that of these two States the portions most distant from the copper mines, to the south and east, yielded the greatest number of copper objects; and also that the implements are materially different in style and mode of construction and workmanship from those in other states. They also give color to the claim, easily made and strongly disputed heretofore, that the Indians of that time knew the art of melting, molding, and casting.

Special researches have been made upon the jade question, as it is presented by my prehistoric work. This is one of the most interesting questions arising in this science. It has been much discussed in Europe, Asia, and America, and considerable progress has been made in the acquirement of knowledge concerning it. But there still exists among the people, even those well informed, much misunderstanding and ignorance upon this question.

The researches upon the subject of arrow or spear-heads or knives has been described under the head of new classification. It was practically a work of invention and had to be gone over and corrected step by step.

The making of the synoptical case was also a labor of special research which I hope was neither impracticable nor unprofitable, but which,

ike the former, was also a labor of invention and had to be wrought out step by step.

I have continued my investigations upon the subject of implements belonging to the paleolithic period, and each step has increased my belief in the existence of such a period. I believe we have found the objects of industry belonging to the man of that period, and have been able to extend the period of his antiquity greater than has before been supposed.

Another subject of special research in regard to material in my department was the investigation into the casts and models of the Aztec and Maya antiquities from Mexico and Yucatan, as comprised in the Lorillard collection made by Mons. Charnay, and by the Abadiano collection. In this work I was materially assisted, in fact it was done almost exclusively by Mr. Gustav Eisen, of the California Academy of Science, who has given years of serious study and investigation to deciphering the Maya hieroglyphs. His interest is centered in the glyphs, hieroglyphs, and ideographs of which this Museum possesses such a rich collection in the form of casts. Mr. Charles Russell, consul at Laguna, extracted and brought away the stone slab forming the right side of the altar of the "Temple of the Cross," and it was deposited in the Smithsonian Institution many years ago. It is described in Dr. Rau's "Palenque Tablet," 1879. This slab was unfortunately broken on its voyage in three pieces nearly equal in size. Upon its arrival at the Smithsonian Institution it was stored in the basement, where, by some unfortunate and unlucky accident in the attempt to remove it, it was again broken into several fragments. It was afterwards put together and restored. Many small pieces were broken out along the edges of the fractures and these were filled with plaster, and the attempt made by engraving in this plaster to reconstruct the glyphs which had been broken. In this the restorers were not successful, and there are now found to be many errors, but the valuable portion of the discovery now made is that some time prior to the fracture of this slab a cast had been taken and a model made, which is now in possession of the Museum. This model contains the correct reproduction of these now broken and destroyed glyphs, so that the plaster cast becomes of greater value than the original slab. I am informed by Mr. Eisen that he has been in communication with Mr. Charnay and that the latter informs him that the casts from which these sculptures were taken have been so far destroyed that they can never be used again; that there are no more, or, at least, but one more set, of these casts of sculptures obtainable, and that if any of these in our possession should be broken or destroyed most of them can never be replaced. Consequently, their value is is greatly enhanced. I feel it incumbent to recommend that the best means be employed by which these valuable specimens be preserved. As their value increases in time in accordance with our knowledge of their importance, rarity, and difficulty of replacing, so we find that they

To W. S. Burt, Youngstown, Ohio, 50 archæological specimens in exchange for fossil fruits. (Sent November 7, 1890.)

To Johann Buntzen Koch, Bozeman, Mont., 50 archæological specimens. (Sent November 8, 1890.)

To L. W. Bailey, University of New Brunswick, Frederickton, New Brunswick, 32 specimens. (Sent November 11, 1890.)

To M. Ch. Gindriez, director of the Museum Châlons-sur-Saône, France, 106 specimens. (Sent January 30, 1891.)

To Dr. C. M. Stubbs, Wakefield, Pa., 50 specimens. (Sent January 28, 1891.)

To Mr. W. H. McGinnis, Youngstown, Ohio, 5 specimens. (Sent May 12, 1891.)

REPORT ON THE DEPARTMENT OF MAMMALS IN THE U. S. NATIONAL MUSEUM, 1891.

By FREDERICK W. TRUE, *Curator.*

Although in the number and importance of accessions the past year will, perhaps, compare favorably with previous ones, many circumstances have conspired to render the year's work less satisfactory than it might otherwise have been.

There was much sickness among the members of the office force, which made it necessary to employ temporary assistants from time to time, and which interrupted the work of those who remained in the service throughout the year. The temporary assistants, being unacquainted with the work, could not proceed very rapidly. This brought a great deal of clerical work upon the curator, who might have been much better employed in matters of a more general character. The correspondence occupies an increasing amount of time. The latter part of the year was almost completely occupied by work connected with preparations for the World's Columbian Exposition. For this no additional clerical aid was granted.

It has resulted that such important matters as the preparation of additional labels for the exhibition series, improvements in the installation and arrangement of specimens, the identifying and assorting of recently-acquired material, revision of catalogues, etc., have received little or no attention.

The department of taxidermy was in a disorganized condition at the beginning of the year, and it was some time before the normal activity was resumed.

The past year was perhaps exceptional on account of the commencement of preparations for the World's Fair. It is doubtful whether the usual conditions will return for two or three years to come.

The chief advances during the year were the large increase in the number of valuable foreign mammals received, the introduction of new storage cases for the reserve series of alcoholics and small skins, and the reorganization of the force of taxidermists under charge of the curator.

IMPORTANT ACCESSIONS.

Dr. W. L. Abbott supplemented the very valuable collection of East African mammals, mentioned in the report of last year, by another of almost equal interest and importance. These are the first African collections of any magnitude which the Museum has received, and Dr. Abbott's generosity in presenting them is very highly appreciated. In addition to the species mentioned in last year's report, the second collection contains specimens of the river hog, *Potamochœrus* sp.; the ichneumons, *Herpestes caffer* and *H. galera*; a pygmy antelope, *Nanotragus moschatus*, and the rare bat, *Megaderma cor*. The collection contains in all 76 specimens, a part of which are preserved in alcohol. In addition, Dr. Abbott presented the skins of 5 lemurs from Madagascar, and one bat from the Seychelles Islands.

A specimen of Kelaart's monkey, *Semnopithecus kelaartii*, was purchased. One important fruit bat, the type of *Pteropus lanigera*, H. Allen, was likewise purchased.

A series of 21 Madagascar insectivores, preserved in alcohol, including a specimen of *Oryzorictes*, was obtained from Fr. Sikora. The collection contained also a specimen of a species of *Nesomys*.

Prof. Miles Rock presented two silky anteaters, *Cycloturus*, from Livingstone, Guatemala. A specimen of the hairy-nosed wombat, *Phascolomys latifrons* was purchased.

Among American mammals, the most interesting accession of the year was, perhaps, an adult male walrus from Walrus Island, Bering Sea, obtained by Capt. W. C. Coulson, of the U. S. Revenue Marine. It is a fine, large skin of this remarkable but rapidly disappearing animal.

Mr. William Palmer, of the museum, was detailed to collect material in the Pribilof Islands, Bering Sea, and on the mainland of Alaska. He obtained the skin of a large Steller's sea-lion, *Eumetopias stelleri*, from Walrus Island, a number of fur seals, and many specimens of marmots, shrews, and Arctic foxes.

Dr. W. L. Ralph, of Utica, N. Y., presented a mounted skin of a gray Florida wolf. The wolf is believed to be almost extinct in that state.

Two pairs of elk antlers interlocked were deposited by the Hon. Clinton L. Merriam, of Locust Grove, N. Y. Interlocking in this species appears to be of extremely rare occurrence.

The skin of an undescribed species of tree mouse, afterwards made the type of *Phenacomys longicaudus* True, was presented by Mr. Aurelius Todd, of Eugene City, Oregon. It was obtained at Marshfield, in Coos County. Dr. J. C. Merrill, U. S. Army, presented a small collection of mice, etc., from the Indian Territory, a region not well represented in the collections. Four skins of the ground squirel, *Spermophilus beldingi*, were presented by Mr. L. Belding, of Stockton, Cal. Mr.

J. B. Power, of Kingsville, Ohio, gave a melanistic chipmunk, *Tamias striatus*. Melanistic individuals are rare in this genus.

Specimens of other species of chipmunks, *Tamias macrorhabdotes* and *T. bulleri*, were received from the American Museum of Natural History, New York. Two skins of the hitherto rare kangaroo rat, *Dipodops compactus* (True), were purchased.

Among bats, the most interesting accessions were two alcoholic specimens of the large *Promops perotis californicus*, obtained by Mr. C. R. Orcutt in San Diego County, California. Mr. Orcutt also presented a considerable number of specimens of other mammals from the same region.

The mammals which have died from time to time in the National Zoölogical Park have been sent by the acting manager to this department of the Museum. Thirty-two specimens have been received from this source during the year, most important among which were a young female Rocky Mountain sheep, a new-born bison, a black bear, and a young ocelot, *Felis pardalis*.*

Mr. P. L. Jouy, an assistant in this department, was employed as a collector for the greater part of the year. He made collections in the Roan Mountain region, North Carolina, and afterwards in Southern Arizona and Northern Mexico. His collections contain many interesting species of small mammals, and all the specimens are prepared in the most careful manner. Considerable purchases of small North American mammals have been made during the year to fill gaps in the study-series of skins. These are all carefully selected specimens of the best quality.

Three groups were completed and placed in the exhibition hall during the year. Most important of these is a group of East African Guereza monkeys (*Colobus caudatus*), which was constructed from skins collected by Dr. W. L. Abbott, in Mount Kilima-Njaro. The species is, perhaps, the most striking and handsomest known. The monkeys are represented as standing on the limb of a large tree, which hangs from the top of the case. The group was constructed by Mr. F. S. Webster.

The group of Prong-horn Antelopes (*Antilocapra americana*), which was withdrawn for enlargement, was completed and installed in its special case. This case had been occupied temporarily by the group of Proboscis monkeys, mentioned in last year's report, and as no permanent case has been provided it was found necessary to put it into one of the wall-cases (quite out of its proper place), so that it can now scarcely be said to be on exhibition. The third group completed during the year is also without a case, and could not be placed so as to be seen properly. This group is one of Bornean Gibbons. The specimens were obtained by Mr. C. F. Adams, who also constructed the group.

Besides the groups, the following single mounted skins were added

* A considerable number of additional specimens were made into skeletons for the Department of Comparative Anatomy.

to the exhibition series during the year: Sun bear, *Helarctos;* Borneo marten, *Mustela;* Small cat, *Felis;* Civet, *Viverra tangalunga;* Muntjak, *Cervulus muntjak* (two specimens); Chevrotain, *Tragulus* sp. (two specimens); Borneo cow, *Bos*; Borneo wild boar, *Sus.*

Two paintings in oil, representing the destruction of the Bison on the Western plains, were hung on the walls of the hall over the east and west entrances. A table for books of reference for visitors was brought into use and a number of books placed upon it. During the reconstruction of the south entrance as a storage-room for the department, it was found necessary to place the boxes containing the reserve series of large skins in the exhibition hall. These were removed as soon as possible, however, and stored elsewhere. The remarks made in the report of last year regarding the crowded condition of the hall are still applicable. The cases now in use are insufficient for the proper display of the good mounted specimens now on hand, but even if a sufficient number of cases were provided it is difficult to see how they could be used in the space now available.

Labels for the group of musk-oxen and for the large whale model were printed and brought into use, and a label for the group of moose was prepared.

The reconstruction of the south entrance of the Museum building to form a storage room and laboratory for this department, which was alluded to in the report of last year, was completed in September, 1890. The storage cases for small skins consist of fifty tin-lined compartments, 2′ 7″ high, 2′ 2″ wide, and 3′ deep. These are provided with light trays. In addition, one half of the available space in the room is occupied by covered shelves for the storage of alcoholics. When the cases for skins were finished all the small skins were transferred to them, and, as far as time would permit, arranged in proper order. The North American series has been kept separate throughout, as these are consulted more frequently than the others. Some additional work has been done in perfecting and verifying the information on the labels, but as this must be done with great care to be of any service, it proceeds slowly. The alcoholics were placed on the shelves and arranged as far as possible. Much work, however, remains to be done in this direction.

The ordinary routine work of cataloguing, labeling, and sorting new accessions was carried on as usual.

Catalogue entries of specimens deposited by the Department of Agriculture to the number of 11,704 were made by our clerks. The entries of previous years were copied together in a single book, and the record of the deposit under consideration now forms a separate section in the series of catalogues. Five preparators were occupied in cleaning the skulls in this collection, either as employés of the Museum, or as contractors. The number of persons so employed has been increased or

reduced during the year, as circumstances demanded. In addition, the taxidermists of the Museum have made up a considerable number of skins received by the Department of Agriculture in an imperfect condition as regards preparation. The Museum has also supplied cases, wood and paper trays, glass vials and stoppers, and labels as called for. One clerk has been employed continuously in cataloguing the specimens, and additional assistance has been given on one or two occasions when the influx of specimens was unusually large. During the month of April two clerks were employed continuously.

In September the curator called attention to the unsatisfactory condition of the department of taxidermy, and shortly afterwards was requested to take charge of the matter and reorganize the force. The force then consisted of only three regular taxidermists and one volunteer, and the number was not increased until spring. One was, however, designated to take general charge of the work, under superintendence of the curator. Certain appliances needed to facilitate work were obtained. The skins which had accumulated in the vats—some 400 in number—were examined and their exact condition and their suitability for mounting or addition to the reserve series determined. A card catalogue of the whole, giving the detailed information regarding each skin, obtained by this investigation, was prepared in duplicate, one copy being placed in the hands of the principal taxidermist and the other held by the curator.

In March preparations for a display in the World's Columbian Exposition were begun and have continued uninterruptedly since that date. A general plan was submitted and approved and steps were taken to obtain the necessary material for exhibition. The force of taxidermists was then increased and a special workshop was fitted up for their use. Mr. William Palmer was appointed chief taxidermist and the number of regular taxidermists was increased to six. One special laborer was also added. It is perhaps unnecessary to speak of this work more in detail in this place, as a full report of what is accomplished will be made at a later date.

The last entries in the several catalogues in June, 1891, were as follows:

Regular series:	
Catalogue of skins and alcoholics	19,482
Catalogue of skulls	35,144
Department of Agriculture deposit:	
Catalogue of skins	28,430
Catalogue of skulls	40,534

The following papers, based entirely or in part upon the collection of the Museum, were published in the Proceedings of the National Museum by the curator and other collaborators during the year:

Observations on the Life History of the Bottlenose Porpoise, by Frederick W. True. *Proc. U. S. Nat. Mus.*, vol. XIII, pp. 197-203.

Description of two new species of Mammals from Mount Kilima-Njaro, East Africa, by Frederick W. True. *Proc. U. S. Nat. Mus.*, vol. XIII, pp. 227–229.

Description of a new species of Mouse, *Phenacomys longicaudus*, from Oregon, by Frederick W. True. *Proc. U. S. Nat. Mus.*, vol. XIII, pp. 303, 304.

Description of a new species of Bat of the genus *Carollia*, and remarks on *Carollia brevicauda*, by Harrison Allen. *Proc. U. S. Nat. Mus.*, vol. XIII, pp. 291–298.

Descriptions of two supposed species of Mice from Costa Rica and Mexico, with remarks on *Hesperomys melanophrys* of Coues, by J. A. Allen. *Proc. U. S. Nat. Mus.*, vol. XIV, pp. 193–195.

Notes on the habits of the Moose in the far north of British America in 1865, by J. G. Lockhart. *Proc. U. S. Nat. Mus.*, vol. XIII, pp. 305–308.

Three collectors were in the field for longer or shorter periods during the year. Mr. P. L. Jouy made collections in the Roan Mountain region, North Carolina, and later in southern Arizona and northern Mexico. Mr. William Palmer visited the Pribilof Islands, Bering Sea, and the adjacent mainland of Alaska. Mr. Wm. H. Brown, who accompanied the U. S. Eclipse Expedition to Angola, remained in South Africa to collect large mammals.

Messrs. B. and H. Geisler were authorized to supply a series of specimens of the mammals of New Guinea. Mr. C. K. Worthen was authorized to collect North American bats and shrews. No material has been received from either of these sources during the year. Mr. E. Wittkugel has collected a small number of mammals for the Museum in Honduras.

A considerable number of mammals were sent to different institutions and individuals during the year. These were as follows:

LOANED FOR STUDY.

To Dr J. A. Allen, American Museum of Natural History, New York—57 skins, 6 alcoholics, and 16 separate skulls of North American rodents (including 2 types), and 1 skull of skunk (type).

To Dr. Harrison Allen, Philadelphia, Pa.—9 bats in alcohol (including 1 type).

To Mr. Walter E. Bryant, San Francisco, Cal.—2 skins of rabbits.

To Col. Cecil Clay, Washington, D. C.—1 skin of rodent.

To Dr. E. A. Mearns U. S. A., Fort Snelling, Minn.—102 skulls and 5 skins of skunks, otters, and badgers (including 1 type).

IN EXCHANGE FOR OTHER SPECIMENS.

To the American Museum of Natural History, New York—4 skins of chipmunks.

To the Australian Museum—1 skin of the prong-horn antelope, 1 skull of the bison.

To the Auckland Museum, New Zealand—15 skins and 1 alcoholic specimen of North American mammals, large and small.

In addition to replies to correspondents of the institution, asking for information on minor topics related to the work of this Department, the curator wrote in full to Mr. Joshua Lindahl, curator of the Illinois State Museum of Natural History, regarding the North American species of opossums. Mr. E. Myer, of Carthage, Tenn., received information regarding a fossil porpoise-jaw found near that town. Mr. Aurelius Todd, of Eugene City, Oregon, received a list of the principal

works of reference on mammals. Information regarding the Cetaceans to which the name of "Cowfish" is sometimes supplied was furnished to Mr. John Robinson, of Salem, Mass. A considerable number of mammals were identified for Mr. G. S. Miller, jr., of Cambridge, Mass. Mr. Richard Rathbun, U. S. Fish Commission, received information regarding the mammals found in and about the Galapagos Islands. An account of the geographical distribution of the American caribous and the European reindeer was furnished Mr. Chas. F. Danfurth, of Boston, Mass. Some facts concerning the "musk-rat" of Anglo-Indians, were transmitted to Dr. Elliott Coues.

In July the curator prepared for publication a description of two new species of mammals from East Africa, and revised the proofs of a paper descriptive of new speices of bats, by Dr. H. Allen, on account of the absence of the author. In September he prepared a report for the year 1890. He was requested, in December, to examine the condition of the bats in the custody of Dr. Harrison Allen, and went to Philadelphia for that purpose.

The collection was found in satisfactory condition. The invoices were checked up anew. Only one specimen could not be accounted for. This had apparently been misplaced.

In March the curator began work on a monograph of the insectivora of North America, and in connection therewith received large collections of moles from the American Museum of Natural History, New York, from the private collection of Dr. C. Hart Merriam, and from the collection of the department of agriculture, under his charge. The curator acted in the capacity of acting curator-in-charge on several occasions.

The general condition of the collection as regards preservation has not altered materially since the last report. On one or two occasions insects were found to be at work on the mounted specimens in the exhibition series, but they were destroyed before any considerable damage was done.

The number of specimens in the several series June 30, 1891, was as follows:

Number of mounted skins in the exhibition series	811
Number of skins and alcoholics in the study and reserve series	8,767
Skins and alcoholics received during the year	465

REPORT ON THE DEPARTMENT OF BIRDS IN THE U. S. NATIONAL MUSEUM, 1891.

By ROBERT RIDGWAY, *Curator.*

GENERAL REVIEW OF THE YEAR'S WORK.

Among the more important special matters attended to during the year 1890–'91 the following are worthy of mention: Five of the exhibition cases, recently remodeled, were filled with specimens properly arranged and labeled. The stock of printed species labels (3,124 in number) was thoroughly overhauled and re-arranged, a sample or reference set being pasted alphabetically on sheets. A very large part of the study collection of American *Passeres* and *Picariæ* (filling thirty-three cases) was transferred to remodeled quarter-unit cases and entirely re-arranged. A popular illustrated handbook on the Hummingbirds, embracing 130 printed pages, with 39 full-page plates, 7 plates of structural details, and 87 outline figures (text-cuts) was prepared and submitted for publication.* A pamphlet of instructions for collecting and preserving specimens of birds (embracing 27 printed pages) was also prepared for publication.†

Several collections of birds sent to us for the purpose by the National Museum of Costa Rica were carefully worked up, the result being the description and publication of a number of interesting new species. A fine collection from the interior of Honduras was also worked up with similar results. Several collections from Africa, notably a large and particularly fine one from the Kilima-Njaro district, made and presented to the National Museum by Dr. W. L. Abbott, has received as much attention as time would permit.

Many specimens were during the year submitted to the curator for determination by Dr. Merriam, Ornithologist of the Department of Agriculture.‡

During four days of November the eighth congress of the American Ornithologists' Union was held in Washington, the office of the curator of the department of birds being headquarters for the members, and

* Published in Rep. Nat. Mus., 1890.

† Published as Part A of Bulletin 39, U. S. Nat. Mus.

‡ This has also been the case during previous years (since the organization of the division of economic ornithology and mammalogy, but mention of the fact was overlooked in my reports.

the meeting place of several committees, especially that on species and subspecies, to the work of which the collections and library of the department, and in a measure the assistance of the curator, were indispensable.

During a considerable part of the month of March much assistance was given to Mr. George K. Cherrie, ornithologist of the Costa Rica national museum, in identifying the specimens in a large collection of Costa Rican birds which he brought with him for that purpose, free access to the collection and library and every other needed facility being given him; and in May similar services were rendered to Mr. Charles A. Keeler, of Berkeley, Cal., while engaged in a special investigation of the origin of color in birds.

The matter of sending exhibits to the World's Columbian Exposition at Chicago having come up for consideration, plans and estimates for an exhibit of birds were prepared and submitted on two occasions, the first requiring material reduction.

NOTES UPON THE MORE IMPORTANT ACCESSIONS RECEIVED DURING THE YEAR.

The total number of specimens added to the bird collection during the year is 2,478, the principal accessions being as follows:

DR. W. L. ABBOTT (Philadelphia, Pa.): One hundred and seven specimens (about 60 species) from the Kilima-Njaro district, eastern Africa; 58 specimens (23 species) from Madagascar, and 59 specimens (22 species) from the Seychelles. (Gift.)

C. F. ADAMS (Champaign, Ill.): A group of Loggerhead Shrikes, or Butcher-birds, showing a pair of old birds with their nest and young, with natural accessories. (Purchased.)

F. B. ARMSTRONG (Brownsville, Tex.): Two specimens of Ferruginous Pygmy Owl (*Glaucidium phalænoides*) and 4 specimens Texas Screech Owl (*Megascops asio mccallii*) from Texas. (Purchased.)

EDWARD BARTLETT (The Museum, Maidstone, Kent, England): Fifty-one specimens (38 species) chiefly *Fringillidæ* and *Ploceidæ* from various localities. (Gift.)

WILLIAM BAYLEY (Washington, D. C.): One specimen of Leach's Petrel (*Oceanodroma leucorhoa*) in the flesh, shot on the Eastern Branch, District of Columbia. (Gift.)

ROLLO H. BECK (Berryessa, Colo.): One specimen of a new subspecies of Finch (*Ammodramus caudacutus becki*) from California. (Gift.)

J. E. BENEDICT (National Museum, Washington, D. C.): One hundred and forty specimens (50 species) from South Carolina. A very valuable collection, adding one United States species to the Museum collection, and very acceptably filling out the series of some of the rarer species, besides materially extending the range of 3 species. (Gift.)

DR. L. G. BILLINGS, U. S. NAVY: Nineteen specimens (14 species) from Africa.

WILLIAM BREWSTER (Cambridge, Mass.): Three specimens of the recently described *Contopus richardsonii peninsulæ*, from Lower California. (Gift.)

HERBERT BROWN (Tuscon, Ariz.): One skin of *Peucæa ruficeps boucardi*. (Through Capt. Charles E. Bendire, U. S. Army. Gift.)

GEORGE K. CHERRIE (San José, Costa Rica): Seventy-three specimens (22 species) from Costa Rica. (Gift.)

W. EAGLE CLARK (Edinburgh, Scotland): Nine specimens (9 species), from England, Azores, Russia, and Japan. (Exchange.)

CHARLES B. CORY (Boston, Mass.): Forty specimens (25 species), chiefly from the West Indies. (Exchange.)

ARTHUR M. COX (Chicago, Ill.): Twenty-seven specimens (21 species), chiefly from vicinity of Chicago. (Gift.)

PROF. A. DUGÉS (Guanajuato, Mexico): One skin of the rare *Picolaptes leucogaster*, from Michoacan, and one Ferruginous Pygmy Owl (*Glaucidium phalænoides*), from Vera Cruz, Mexico. (Gift.)

ECLIPSE EXPEDITION: Thirteen specimens (8 species), from Africa. (Navy Department.)

DENIS GALE (Gold Hill, Colo.): Four specimens (3 species), from Gold Hill, Colo. (Through Capt. Bendire. Gift.)

H. V. HENSON (Hakodadi, Japan): Four hundred and twenty-seven specimens (181 species) from the Island of Yesso (chiefly near Hakodadi), Japan. A specially valuable collection containing a number of species entirely new to the collection, among them a pair of the great Japanese Eagle Owl (*Pseudoptynax blakistoni*), the first ever received by any American museum. (Purchased.)

P. L. JOUY (National Museum, Washington, D. C.): Fifty-four specimens (33 species), from Tucson, Ariz. (Collected by Mr. Jouy for the Museum.)

P. L. JOUY (National Museum, Washington, D. C.): Thirty specimens (17 species) from Arizona. (Collected by Mr. Jouy for the Museum.)

P. L. JOUY (National Museum, Washington, D. C.): Thirty specimens (10 species) from mountains of North Carolina; 45 specimens from Tucson, Ariz., and Guaymas, Mexico. (Collected by Mr. Jouy for the Museum.)

W. C. KENDALL (U. S. Fish Commission): Thirty specimens (26 species), from South Carolina. (Gift.)

R. MCFARLANE (chief factor Hudson Bay Company): Sixty-two specimens (40 species), from Moose Fork and Cumberland House, Hudson Bay Territory. (Gift.)

Dr. EDGAR A. MEARNS, U. S. Army (Fort Snelling, Minn.): One specimen of Western Evening Grosbeak (*Coccothraustes vespertinus montanus*), in first plumage, from Arizona. (Gift.)

THOS. J. LUTTRELL (Washington, D. C.): One Golden Eagle (*Aquila chrysaëtos*), in the flesh, from the vicinity of Washington. (Gift.)

W. ALLISON MERRITT (Washington, D. C.): Two specimens of Least Tern (*Sterna antillarum*), from Northumberland County, Va. (Gift.)

MUSEO NACIONAL DE COSTA RICA (San José, Costa Rica, through Anastasio Alfaro, director): The unique type-specimen of a new species of Whippoorwill (*Antrostomus rufomaculatus* Ridgw.), from the volcano of Irazú, Costa Rica. (Gift.)

MUSEO NACIONAL DE COSTA RICA (San José, Costa Rica, through Geo. K. Cherrie): Sixty-five specimens (35 species), from Costa Rica. (Exchange.)

E. W. NELSON (Springerville, Arizona): A young example of Scott's Oriole (*Icterus parisorum*), from near Santa Fé, N. Mex.; valuable as considerably extending the breeding range of the species. (Gift.)

WILLIAM PALMER (National Museum, Washington, D. C.): Three hundred and nine specimens (43 species), chiefly from Unalaska and the Pribylof Islands, Alaska. (Collected by Mr. Palmer for the Museum.)

MUSEUM OF NATURAL HISTORY (Paris, France): Forty specimens (36 species), chiefly from Madagascar. (Gift.)

Dr. A. G. PRILL (Sweet Home, Oregon): Four specimens (adult male and female and young) of the Ring-necked Pheasant (*Phasianus torquatus*), from Oregon; two accessions. (Gift.)

Dr. WILLIAM L. RALPH (Utica, N. Y.): Three skins of young of *Syrnium nebulosum alleni*, in various stages, from Florida. (Gift.)

C. W. RICHMOND (Washington, D. C.): Forty-five specimens (36 species), chiefly from Chapada, Matto Grosso, Brazil; two accessions. (Exchange.)

ROBERT RIDGWAY (National Museum, Washington, D. C.): One hundred specimens (56 species), chiefly from Illinois and Indiana. (Collected for the Museum): 44 specimens (29 species), chiefly from Laurel, Md. (Gift.)

C. B. RIKER (New York City, N. Y): Three hundred and ninety-nine specimens (228 species) birds from the Lower Amazon (chiefly from Diamantina and Santarem). A specially valuable collection, containing types of 19 new species described by the curator in the Proceedings of the National Museum (Vol. x, pp. 516–528), and 28 species previously unrepresented in the Museum collection. (Purchased.)

W. E. D. SCOTT (New York City, N. Y.): One hundred and five specimens (27 species), from Punta Rassa and Tarpon Springs, Fla. (4 specimens, and 2 species from the Dry Tortugas), collected chiefly in 1886. (Gift.)

PERCY W. SHUFELDT (Takoma Park, D. C.): Seven specimens (7 species) from Fort Wingate, N. Mex., and District of Columbia. (Gift.)

Dr. R. W. SHUFELDT (Takoma Park, D. C.): One Evening Grosbeak (*Hesperiphona vespertina*) in the flesh. (Gift.)

DR. H. M. SMITH (Washington, D. C.): Two specimens (*Pipra aurocapilla* and *P. coronata*) from Chapada, Matto Grosso, Brazil, and one specimen of Western Horned Owl (*Bubo virginianus subarcticus*) from New Mexico. (Gift.)

WILLIAM G. SMITH (Loveland, Colo.): One specimen of the rare Flammulated Screech Owl (*Megascops flammeola*), from Colorado. Two specimens of Swainson's Hawk (*Buteo swainsoni*), downy young; new to the collection.

FRANK W. SPARKS (St. Louis, Mo.): One mounted Fulvous Tree-duck (*Dendrocygna fulva*), shot at New Madrid, Mo. (Gift.)

L. STEJNEGER (National Museum, Washington, D. C.): Twelve specimens (9 species), from Arizona. (Collected in 1889 for the Museum.)

WILLIAM WARREN (Salem, Oregon): Two skins of *Megascops asio saturatus* Brewst. from Oregon. (Purchased.)

GEO. B. WINTON (San Luis Potosi, Mex.): Four specimens (same number of species), in the flesh, from San Luis Potosi. (Gift.)

ERICH WITTKUGEL (San Pedro Sula, Honduras): One hundred and ninety-four specimens (86 species) from the interior of Honduras. (Purchased.)

ROUTINE WORK, INCLUDING THE PREPARATION OF SPECIMENS.

A considerable part of what might be included under the above heading has already been mentioned and need not be again alluded to. The following is additional thereto: The number of specimens mounted for the exhibition series during the year is 395 and of specimens made into skins, 45.

A considerable amount of minor routine work has also been performed.

REVIEW OF SPECIAL RESEARCHES PROSECUTED UPON MATERIAL BELONGING TO THE DEPARTMENT.

Under this heading may be mentioned investigations by Mr. Charles A. Keeler, of Berkeley, Cal., on the subject of origin of color in birds; by Mr. George K. Cherrie, ornithologist of the Costa Rica National Museum, aided by material brought with him from Costa Rica for that especial purpose; by Dr. Leonhard Stejneger, on the Japanese bird fauna, and by the curator, on various groups of birds. The character

and extent of these researches, so far as published, is indicated in the list of papers published during the year and printed in Section IV of the report.

PRESENT STATE OF THE COLLECTION.

So far as preservation is concerned, all the specimens contained in cases of reasonably modern pattern are absolutely untouched by insects. The mounted birds, being in remodeled old cases which freely admit both dust and insects, have been subject to more or less injury, but constant vigilance has kept them free from material damage. A considerable part of the duplicate collection, kept in ordinary open drawers (for want of better), have been to some extent injured by insects.

The number of specimens contained in the collection at the end of June, 1891, is, approximately, as follows:

	1889–'90.	1890–'91.	Increase.	Decrease.
Study series	46,543	*49,995	3,452	.....
Exhibition series	7,133	†7,403	270	.....
Duplicate series	6,543	5,408	.....	‡1,135

* Number estimated.

† Number ascertained by actual count.

‡ One hundred and sixty-one duplicates distributed, the remainder put back into reserve series.

The actual number of specimens in the study series can not be known until the more bulky portion of it, now stored in the west basement, where the specimens are so crowded that it is impossible to count them, has been rearranged in more convenient cabinets.

The number of the last catalogue entry in the Museum register of birds in June, 1890, is 118,369, and in June, 1891, 120,752.

REPORT ON THE SECTION OF BIRDS' EGGS IN THE U. S. NATIONAL MUSEUM, 1891.

By CHARLES E. BENDIRE, U. S. ARMY (retired), *Honorary Curator.*

The character of routine work has been as follows: Taking the measurements, numbering and arranging 842 specimens; the revision and arrangement, in numerical order, of 259 register sheets, and determining the average measurements of each genus thereon recorded.

In addition to the above work I have been engaged in preparing the manuscript to the completion of Vol. I of "Life Histories of North American Birds," and also in reading proofs thereof, which have, up to this time, covered 220 quarto pages of composition. Considerable progress has also been made in gathering and classifying material for the second volume.

The following important accessions were received during the year:

FRANK B. ARMSTRONG (Brownsville, Texas): One nest and 2 eggs of *Amazillia cerviniventris;* 2 nests and 6 eggs *Sporophila morelleti;* 3 eggs *Glaucidium phalænoides;* 4 eggs *Engyptila albifrons;* 7 eggs *Megascops asio mccallii.* (Purchased.) The first three species are new to the collection.

Mr. R. MACFARLANE (chief factor of the Hudson Bay Company): An interesting collection of 100 eggs and 9 nests, embracing 21 species, all from the Cumberland district, Saskatchewan, Canada.

Mr. DENIS GALE (Gold Hill, Bowlder County, Colo.): A finely prepared collection of 45 eggs, embracing 11 species.

Dr. C. HART MERRIAM (Department of Agriculture, Washington, D. C.): One nest and 3 eggs, *Dendroica cærulea.* Rare.

Dr. WILLIAM L. RALPH (Utica, N. Y.): Seventy eggs, embracing 13 species, from Florida and Texas. All are rare and many new to the collection.

Mr. WALTER F. WEBB (Geneva, N. Y.): Three eggs, *Buteo borealis,* and 15 eggs, *Buteo lineatus.*

Mr. THOMAS H. JACKSON (West Chester, Pa.): Forty-four eggs *Callipepla squamata castanogastris.*

Mr. WILLIAM L. BISHOP (Kentville, Nova Scotia); Thirteen eggs, *Dendrogapus canadensis.*

Mr. WILLIAM G. SMITH (Loveland, Colo.): Four eggs, *Megascops flammeolus;* 4 eggs, *Phalaropus tricolor;* 8 eggs, *Vireo solitarius plumbeus.* The first and last are new to the collection.

Mr. G. K. CHERRIE (San José, Costa Rica): One egg of *Vireo flavoviridis.* New to the collection.

Mr. WILLIAM PALMER (U. S. National Museum, Washington, D. C.): An interesting collection, consisting of 10 nests and 112 eggs, embracing 11 species, from St. Paul and Walrus Islands, Alaska.

Mr. W. E. TRAILL (of the Hudson Bay Company): Fifteen eggs, *Dendragapus franklini,* rare; 4 eggs, *Totanus melanoleucus, rare;* 9 eggs, *Bonasa umbellus togata.*

CONDITION OF THE COLLECTION.

During the year 83 nests have been received, of which some of the rarer species have been mentioned.

Number of specimens in the North American series	31,992
Number of specimens in the duplicate series	11,548
Number of specimens on exhibition	1,491
Total	45,031
Number of species and subspecies in North American series	760
Number of specimens in foreign reserve series	4,330
Number of specimens in duplicate series	231
Total	4,561
Number of species in foreign series	611
Number of nests in reserve series	2,339
Number of nests on exhibition	235
Total	2,574
Last catalogue entry in June, 1890	24,004
Last catalogue entry in June, 1891	24,336
Total number of entries during the year	332

The consignments from the biological expedition, under the direction of the Department of Agriculture, Dr. C. Hart Merriam in charge, covering 88 entries, are included in the above total number of entries, and if all or part thereof should prove to be accessions, they will be duly acknowledged.

REPORT ON THE DEPARTMENT OF REPTILES AND BATRACHIANS IN THE U. S. NATIONAL MUSEUM, 1891.

By LEONHARD STEJNEGER, *Curator.*

The year 1890–'91 has been one of unusual activity in the herpetological department, no less than 908 specimens having been entered. In most cases these specimens have been identified, except those for the determination of which the necessary material for comparison or the literature has not been accessible.*

The installation of the collection in jars, upon the new shelving provided during the previous year, has been continued, and the entire extralimital collection, thus preserved, has been placed on the shelves, card-catalogued, and arranged according to localities. The number of jars accommodated was 1,235, containing 2,840 specimens. Many of these had to be reentered and reidentified, and all have been labeled.

The collection of North American turtles has been similarly attended to, but the curator has not attempted to arrange it definitely, as it was understood that Dr. G. Baur, of Clark University, was going to undertake it. The collection was card-catalogued, however, showing a number of 460 specimens.

The collection of North American snakes is in the same unsatisfactory condition as in the preceding year and can not be much improved until all the material which has been and which may yet be sent to Prof. Cope has been returned by him.

During the early part of the year the entire reserve series of North American batrachians was transferred from the old quarters in the basement and arranged in systematic order on the shelves, catalogued and counted. The number of jars thus transferred and arranged was 1,654, containing 7,020 specimens. Much time was spent in verifying and correcting the identifications and data on the labels and in the record books.

First in rank among the many valuable accessions received during the present year, Mr. P. L. Jouy's collections from southern Arizona must be placed, both in regard to quantity and quality; the copious

* For comparison, it may be mentioned that the number of entries in 1889–'90 was 705; in 1888–'89, 784; in 1887–'88, 19; in 1886–'87, 138.

field notes, the extensiveness of the series of some of our most difficult and interesting reptiles, and their excellent preservation makes this collection one of unusual value and merit. The study of this material will result in greatly increasing and correcting our knowledge of the herpetology of our southwestern border.

Dr. C. Hart Merriam's collection, made during his biological reconnoissance in Idaho, 1890, and deposited by the U. S. Department of Agriculture, though less extensive, because made in a country less rich in reptiles, is hardly less valuable or interesting, and for the same reasons. The curator has already published a report upon this material.

Special thanks are due to Mr. Charles R. Orcutt, of San Diego, Cal., for a large collection of South Californian reptiles, chiefly from the Colorada Desert, many of which are rare in collections.

Through Mr. Charles K. Worthen another interesting collection, from Cameron County, Tex., was secured.

Of the exotic collections none exceed in importance those brought home by Dr. W. L. Abbott and generously donated by him to the Museum, being, as they are, from localities unrepresented in our collections, viz, the Seychelles, Madagascar, and Kilima-Njaro, East Africa. Only a portion of this material is as yet identified, but the curator has already been able to describe two new species from the last mentioned locality, viz, *Chamæleo abbotti* and *Lygosoma kilimensis*.

Among the many other contributors the following deserve special mention: Herbert Brown, Arizona; Julius Hurter, St. Louis, Mo.; U. S. Fish Commission; H. H. and C. S. Brimley, Raleigh, N. C.; Gustave Kohn, New Orleans, La.; C. F. Batchelder, Cambridge, Mass.; G. A. Allen, Parker, Ariz., and Dr. R. W. Shufeldt, Takoma Park, D. C.

During the early part of 1891, Prof. E. D. Cope spent some time in working up a number of snake genera as well as in reviewing the lacertilian genus *Cnemidophorus*.

Dr. O. P. Hay, of Irvington, Ind., spent some time in the department studying the material at hand bearing on the herpetology of Indiana, a work which he is now preparing for publication by the geological survey of the State of Indiana.

The curator during the year was prevailed upon to assume, in addition to his other duties, the editorship of the new supplement to the "Nomenclator Zoologicus," and about one-fourth of his time has consequently been devoted to this work. During the time that could be spared from the above and the routine work, he continued his studies of the collection, but the immediate needs of the latter prevented any special devotion to any one particular subject. The titles of the papers prepared and submitted for publication will, perhaps, show this better than anything else, and a list of these is therefore hereby appended, as follows:

(1) Seebohm's Birds of the Japanese Empire. (A review.)

(2) Description of a New Genus and Species of Tailless Batrachian from Tropical America. (Jointly with Frederic C. Test.)

(3) Annotated List of Reptiles and Batrachians collected by Dr. C. Hart Merriam and Party in Idaho, 1890.

(4) Crotalus pyrrhus in California.

(5) Description of a New Species of Chameleon from Kilima-Njaro, Eastern Africa.

(6) Description of a New North American Lizard of the Genus Sauromalus.

(7) Description of a New Species of Lizard from the Island of San Pedro Martir, Gulf of California.

(8) Directions for Collecting Reptiles and Batrachians.

(9) Descriptions of a New Scincoid Lizard from East Africa.

(10) Notes on Sceloporus variabilis and its Geographical Distribution in the United States.

During the earlier part of the year the curator had the temporary assistance of Mr. F. H. Garrison, who attended to the work of transferring the specimens from the basement to the new quarters.

In November, 1890, however, Mr. Frederick C. Test, a graduate of the Indiana State University, was appointed an aid, and assigned to this department for one-half of his official time, the other half to be devoted to work on the new supplement to the "Nomenclator Zoologicus." When time could be spared from the routine work he made some investigations bearing upon the dentition of *Desmognathus fuscus* and upon the geographical distribution and variation of *Hyla regilla*.

He was joint author with the curator of the second paper of the list given above, and he also prepared the illustrations accompanying it.

Owing to the fact that a great deal of the material belonging to the Museum is at present in Prof. Cope's possession in Philadelphia, it has been found impossible to give accurate census of the herpetological specimens of the Museum.

In preparing the following estimate, that of last year has been taken as a basis, deducting those specimens which have been disposed of by exchange, or otherwise, and adding the number of those catalogued during the year. Such an estimate would show the status of the collection on June 30, 1891, to be as follows:

	Specimens.
Reserve series	14,878
Duplicate series	8,744
Unassorted and exotic	6,313
Grand total	29,935

Last catalogue entry in June, 1890, is No. 16228; last entry in June, 1891, 17136.

REPORT ON THE DEPARTMENT OF FISHES IN THE U. S. NATIONAL MUSEUM, 1891.

By TARLETON H. BEAN, *Honorary Curator.*

The year 1890–'91 has been an important one to this department. Many new and interesting fishes have been received and preserved, a large amount of correspondence has been attended to, and the condition of the collections greatly improved. The total number of accessions received during the year is forty-six. These have all been administered upon, the specimens catalogued, and the desiderata carefully preserved. All types of new species, unless too large, are at once bottled and placed in their proper places.

The assistant curator, Mr. Barton A. Bean, had charge of the department during the curator's absence, and attended to all routine matters, besides performing special duties mentioned elsewhere in this report.

In the first part of the year the curator made an investigation of Great South Bay, and reported upon the fishes found in its waters. This was published in the Report of the Fish Commissioners of the State of New York for the year 1890. In the fall of 1890, in connection with the Assistant Secretary, the curator worked upon deep-sea fishes. During the remaining portion of the year his duties at the Fish Commission were such as to allow no time for Museum work.

The following are among the most important accessions received during the year ending June 30, 1891, although by far the larger number of the contributions made during the year are interesting and constitute acceptable additions to the collection:

THE MUSEUM OF NATURAL HISTORY (Paris, France): The following types of new species of deep-sea fishes were transmitted: *Neostoma quadriculatum; Bathygadus melanobranchus; Bathypterois dubius; Halosaurus johnsonianus; Halosaurus phalarus; Xenodermichthys socialis; Macrurus similiophorus; Leptoderma macrops; Centrophorus squamosus.* (Acc. 23345.)

UNITED STATES ECLIPSE EXPEDITION TO WEST AFRICA (through the coöperation of the officers of the expedition): Large collections of fishes were made by Messrs. W. H. Brown and A. H. Brown. These contained many desiderata from the Azores, St. Vincent, Free Town, Cape Town, Elmina, Ashantee, St. Paul de Loanda, Quanza River, and Ascension Island. (Acc. 23272.)

U. S. FISH COMMISSION: Large collections of fishes from Missouri, Arkansas, and a few from Colorado and Georgia were received. These collections, which were made by Drs. Jordan, Meek, and others, contained several newspecies. (Acc. 23493.)

U. S. FISH COMMISSION: The following new species were collected in deep water off the coast of Lower California by the steamer *Albatross*, and were transmittted to the Museum: *Bathytroctes stomias; Cynoscion macdonaldi; Thalassoma grammaticum; Thalassoma socorroense*; *Sebastichthys sinensis; Icelinus tenuis; Icelinus fimbriatus; Bathyagonus nigripinnis; Xenochirus triacanthus; Xenochirus pentacanthus; Xenochirus latifrons; Cryptotrema corallinum; Plectobranchus evides; Lycodapus fierasfer; Platophrys taniopterus, and Radulinus asprellus.* (Acc. 23787.)

U. S. FISH COMMISSION: A large collection of fishes made by the steamer *Albatross*. at Bahia, Brazil, was received. Among others, the following new species: *Paralichthys isosceles, Verecundum rasile,* and *Psammobatis rutrum.* This accession contained also a few fishes from Patagonia, the Straits of Magellan, and the Abrolhos Islands, collected by the same steamer. (Acc. 24039.)

U. S. FISH COMMISSION: Large collections of fishes made by the steamer *Albatross* at the Galapagos Islands and Panama, including *Priacanthus serrula* (type) were received. (Acc. 24037.)

U. S. FISH COMMISSION: A collection of fishes made by William P. Seal and party in the Chesapeake Bay at Cape Charles City, Va., was received. (Acc. 23900.)

O. P. JENKINS and BARTON W. EVERMANN: A collection of fishes from the Bay of Guaymas, Mexico, including the following new species, was received: *Rhinoptera steindachneri; Upeneus rathbuni*; *Menidia clara; Pseudojulis venustus; Citharichthys gilberti; Hermosilla azurea; Auchenopterus asper; Psednoblennius hypacanthus; Gobius chiquita* and *Gobius longicaudus; Gillichthys y-cauda; Gillichthys guaymasiæ; Gnathypops scops; Opisthognathus ommata.* (Acc. 23988.)

Mr. P. H. KIRSCH and party: A collection of fishes obtained from Alabama. (Acc. 24047.)

ROUTINE WORK.

The number of entries in the register of this department during the year is 1,542, representing about 5,000 specimens. The types of the new species received, as well as many others, have been bottled, labeled, and installed in their proper places. The card-catalogue of bottled specimens has been carried forward as usual, and a large number of jars have been relabeled. A very large number of duplicates have been selected and a still larger number of entirely worthless fishes thrown out. A vast amount of old material was identified and many blanks in the registers filled out. The entire collection of fishes was gone over and its condition much improved. There yet remains considerable material awaiting classification. The accessions have been reported upon promptly in almost every case. The correspondence has been much larger than last year, and all letters have been fully and promptly answered.

SPECIAL RESEARCHES.

Papers describing the new forms received are, for the most part, published in the "Proceedings" of the Museum. In the Bibliography accompanying this Report will be found a list of ninety-two papers, based mostly upon the material in this department.

Dr. Theodore Gill studied various families of fishes, drawing upon the material here to a large extent; Dr. D. S. Jordan, president of the Leland Stanford Junior University, wrote a review of the eels, for which purpose he examined the species in our collection. Mr. B. A. Bean has been engaged on the work of identifying and classifying miscellaneous lots of fishes, gathering material bearing especially upon the Chesapeake and its tributaries, selecting, and in many cases identifying, specimens intended for distribution; and in April, 1891, commenced to make a list of the fishes to be found in the markets of Washington, D. C. Drs. Goode and Bean have continued their work upon the deep-sea fishes, pushing it forward very rapidly during the fall of 1890.

Prof. C. H. Gilbert continued his studies upon the fishes of the northwest coast, collected by the steamer *Albatross*. Dr. C. H. Eigenmann and Mrs. Eigenmann carried on their work upon the fishes of the coast of California, more especially those of San Diego Bay. Several of the students of the University of Indiana, under the auspices of the U. S. Fish Commission, studied the fishes of the West and Southwest, Prof. B. W. Evermann, O. P. Jenkins, S. E. Meek, and others being prominently identified with this work. Prof. S. A. Forbes, of the State Normal School at Champaign, Ill., has continued his valuable investigations into the food of our fresh-water species.

EXPLORATIONS.

The U. S. Fish Commission steamer *Albatross* cruised in Bering Sea during July and August, 1890. The cod and halibut banks were examined and many dredgings were made. The collection of fishes obtained was large and interesting, containing, as it did, many new forms. In January, 1891, the *Albatross* proceeded southward and made very large collections of fishes off Panama, especially through the Galapagos Islands. The U. S. Fish Commission steamer *Fish Hawk* was engaged in an investigation of the oyster beds along the coast of South Carolina during the winter and early spring of 1891. A small collection of fishes was made by Mr. W. C. Kendall, one of the assistants on board.

Mr. William P. Seal, for the U. S. Fish Commission, collected fishes in the Chesapeake Bay (September 19 to October 5, 1890), at Cape Charles, Virginia, and vicinity. About sixty species were obtained. These have been reported upon by the assistant curator in a paper published in the "Proceedings" of the Museum.

REPORT ON THE DEPARTMENT OF VERTEBRATE FOSSILS IN THE U. S. NATIONAL MUSEUM, 1891.

By FREDERIC A. LUCAS, *Assistant Curator.*

There have been few accessions to this department during the year, the only one of importance being a partial skull of *Bison latifrons* from Florida, presented by Gen. L. W. Colby.

Preliminary steps have been taken for the preparation of a new and much needed catalogue of the material belonging to this department, most of the specimens at present being entered in the books of the department of comparative anatomy, while in many instances no name, or if any, an incorrect one, appears in the catalogue.

Twenty-seven specimens have been mounted for exhibition during the year, and a wall case has been built along the east side of the southeast court for the reception of a large and valuable series of Western fossils being prepared under the direction of Prof. O. C. Marsh.

The card catalogue, prepared last year, shows 1,080 specimens, many of them of great value, being the types of their respective species. Of these 180 have been placed on exhibition and others will be added as soon as possible. The greater portion will remain in the reserve series, for the number of duplicates is small.

The specimens have been roughly classified, and arranged in trays, and although much work is needed to put them in thorough order, they are now in good condition and are available for further study.

This department is very much in need of more room, both for the study and exhibition series, the only five cases for which space is available being completely filled.

A large amount of unclassified material is now in storage, and while a portion of this is probably of little value, yet much of it is important for study and exhibition purposes, and owing to lack of space it is impossible to examine the specimens and render them available.

A good study series is extremely desirable in order to properly name the specimens which, from time to time, are sent to the Museum for identification, and until more room can be obtained this important portion of the collection must suffer.

REPORT ON THE DEPARTMENT OF MOLLUSKS (INCLUDING CENOZOIC FOSSILS) IN THE U. S. NATIONAL MUSEUM, 1891.

By WILLIAM H. DALL, *Honorary Curator.*

The force of the department of mollusks during the past year has, in addition to the honorary curator, included Dr. R. E. C. Stearns, U. S. Geological Survey, adjunct curator; Mr. Charles Torrey Simpson, aid; Mr. S. Hazen Bond, copyist, and Miss N. C. Beard, copyist. The three last mentioned have comprised the paid force of the department, while, as in previous years, by permission of the Director of the U. S. Geological Survey, in addition to the curator, Dr. Stearns, Mr. Gilbert D. Harris, and Mr. Frank Burns, of the U. S. Geological Survey, have devoted more or less of their time to the work of the department in connection with their paleontological studies, with valuable results. The writer has, with the permission of the Director of the Geological Survey, continued to act as honorary curator.

Excellent progress in the routine work of the department has been made during the year. The number of registrations is about the same as that of last year, but in other directions the progress made has been exceptional. The tops of the new cases on the ground floor of the Smithsonian have been utilized by placing the Lea collection of *Unionidæ* on exhibition, and filling the remaining tables with specimens suitable for exhibition. Owing to the onerous duties of the entire staff, due to delays caused by an unusual amount of sickness, part of the central upright cases still remain to be filled and arranged.

It is with great regret that I am obliged to note that the imperfect health of my coadjutor, Dr. Stearns, has obliged him to seek rest. He has been able to render services of a kind for which few are qualified. His energy, devotion, and knowledge have been of the highest value to this department, and his absence nearly doubles the work of the curator.

GENERAL OPERATIONS.

The general operations of the department, as in previous years, have comprised: (1) The determination, labeling, proper assorting, and registration of specimens, old and new; and (2) the preparation of special reports on Government collections made by other branches of the Executive Departments, such as the U. S. Fish Commission, the U. S. Navy,

the Revenue-Marine Service, the Department of Agriculture, and also by special expeditions.

The number of registrations shown in the table is about the same as in recent years, and I am glad to be able to state that we are visibly approaching a point when we shall be able to see the end of the ancient arrearages of which such a mass existed a few years ago. Once cleared away the department, as at present constituted, will be able to keep abreast of the accessions with ordinary diligence, to systematize our duplicate material, ascertain what are the important gaps in our collection, and take the necessary steps for filling them. Already our collection ranks among the most important in the world, and if two or three other collections surpass it in some respects, there is no existing collection which it does not surpass from many other standpoints, especially as regards the scientific data associated with the material it contains and the thorough system of registration and identification applied to the specimens. I think I may say that there is no collection affording greater facilities for the scientific use of the material it contains. Unfortunately, our library lacks many of the most important works on mollusks, and several of those which we possess are practically inacessible for want of binding. Without the private library of the curator very little work could be done, and many of the more important recent works are inaccessible in any of the libraries in this city. I may call attention here to the fact that many of the conchological publications of the Smithsonian Institution are practically out of print, and that every few days applications are made, in the vain hope of obtaining them, by students in the various parts of the country. It is to be hoped that some of them, such as the "Mollusks of Western North America," by Carpenter, and Tryon's "Strepomatidæ," may be soon reprinted for the use of students.

A number of papers have been published during the past year by the writer and by Dr. Stearns, a list of which will be found in the Bibliography (Section IV). The most important of these, perhaps, is Part I of the writer's report on the Tertiary Mollusks of Florida, issued in September, 1890, by the Wagner Free Institute of Science, Philadelphia. Part II will follow at a convenient date.

A large part of the curator's time has been devoted to the preparation of a general report on the Neocene formations of the United States for the U. S. Geological Survey. This has been completed, and is now in the printer's hands. Dr. Stearns has devoted much time to an investigation of the mollusks of the Galapagos Islands, and the manuscript is nearly ready for publication.

ACCESSIONS DURING THE YEAR.

The number of accessions during the year was 79. In 1889–'90 the number was 46. It will be observed that the number of accessions is nearly double that of last year, and I may add that the amount of *material is also* considerably greater and more valuable.

The more important accessions are included in the following enumeration:

T. H. Aldrich, esq. (Blocton, Ala.), sent a number of typically named specimens of Eocene Tertiary fossils studied by Otto Meyer.

Hon. Delos Arnold (California) contributed an interesting series of Pliocene and Pleistocene fossils of that State, chiefly from the southern coast.

Mr. R. L. Bartleman (of United States legation at Carácas, Venezuela), has presented some very interesting marine shells of that coast, including a beautiful series of the Argonaut from the youngest to the adult shell.

A collection less attractive but scientifically important, in the shape of his types of American slugs, in alcohol, completing the typical Binney collection of the Museum, was presented by Mr. W. G. Binney.

From the British Museum a series of 31 species collected by the *Challenger* expedition were received, including several varieties new to the collection.

A few interesting Arctic species from the Kara Sea were contributed by the Royal Zōological Museum of Copenhagen.

From Mr. Hugh Fulton, of London, a number of extremely rare African and other shells were purchased or obtained by exchange. These were forms needed to complete the series, and which there was no reasonable prospect of obtaining except by purchase.

A remarkably fine series of *Tritonium femorale* from the Bahamas was obtained from Mr. I. Greegor, who has also donated a number of interesting shells from various localities.

Dr. H. von Ihering of Rio Grande do Sul, Brazil, sent a number of South American marine and fresh-water shells from that region, several of which were new to the collection, and nearly all from localities not represented in our series.

Dr. Robert T. Jackson, of Boston, contributed a series of young stages of oysters and other bivalve shells, illustrative of his recent memoir on the Phylogeny of the Pelecypoda.

Mr. William Palmer collected while at St. Paul Island, Bering Sea, a very interesting series of shells and Miocene fossils.

From Miss Ida Shepard and Mrs. M. Burton Williamson, of Santa Barbara County, Cal., various interesting California species were received on several occasions.

Mr. Frederick Stearns, of Detroit, Mich., sent for exchange the first series of duplicates of his very interesting and valuable collection recently made in Japan.

From the U. S. Department of Agriculture, through Dr. C. Hart Merriam, in charge of the Division of Economic Ornithology, a number of small lots of land shells and fresh-water shells, collected by the agents of the Department in Arizona and other parts of the southwestern United States, were received. These contained several novelties, which have been described by Dr. R. E. C. Stearns.

From the U. S. Fish Commission a collection made by the schooner *Grampus* on the Labrador coast, and various collections from the North Pacific coast, dredged by the *Albatross*, were received.

Mr. Joseph Willcox contributed several boxes of Pliocene and other fossils, chiefly from Florida. These contained much that is interesting.

ROUTINE WORK.

The routine work of the past year has not differed greatly from that of the preceding year. It has been marked by the completion of the work on the Lea collection, which is now entirely registered. The Naiades have been placed on exhibition in the new cases; while the duplicates are being arranged for easy access by Mr. Simpson with a view to future exchanges. A large amount of work on fossiliferous

marl and gravel, yielding many hundreds of specimens, has been accomplished by Miss Beard and Mr. Burns during the year. The work of answering queries on various subjects connected with mollusks, and assisting students in different parts of the country to direct their studies and to identify their local faunæ, has always been regarded as important, and was particularly referred to in the last report of the curator. About 78 individuals were included in the list of those thus communicated with during that year, which was nearly double the number of the year preceding. During the year 1890–'91, to which the present report refers, the number of correspondents has been no less than 166, the correspondence including over 300 letters and 600 or 700 pages of manuscript, besides the identification, or noting, of not less than 1,200 species of mollusks. This work has been performed by the curator, assisted by Dr. Stearns and Mr. Simpson, without the advantage of a stenographer or typewriter. It is obvious that if the work continues to increase in like ratio, additional facilities will be required.

SPECIAL RESEARCHES.

The bibliographical notices under the names Dall, Simpson, and Stearns (see Section IV) will indicate the direction of the researches carried on by the staff during the year. Most of the curator's time has necessarily been devoted to a review of the state of our knowledge of the later tertiary of the United States. This has been completed and is in the printer's hands, but will not be included in the Bibliography accompanying this volume.

Dr. Stearns has continued his work on the shells of the Galapagos and of the western coast of South America, chiefly from the *Albatross* voyage, but his ill-health has prevented its completion.

Mr. Simpson continues to devote much of his leisure to a study of the Florida Unios, aided by the types of the Lea collection and by material derived from various sources.

CONDITION OF THE COLLECTION.

In previous reports it has been explained why it is not yet possible to give the exact number of species, specimens, duplicates, etc., contained in the collection under my charge. In my last report it was estimated that the collection contained about 471,500 specimens, of which one-fourth are preserved in alcohol. About 5,000 specimens are estimated to have been received during the year, which would make a present total of about 476,500 specimens.

The number of entries in the registers for 1889–'90 was 6,569. For the present year it amounts to 5,764, equivalent to about 17,292 specimens. The total number of registrations to date, deducting all duplications or omissions, is 100,667, representing 302,000 specimens.

The number of workers and their distribution in different parts of the

building requires the use of several volumes of the register simultaneously. This will explain why the following table is necessary to show the total registration for the entire year. The formal registration (with the gaps alluded to) terminates June 30, 1891, with number 122524.

Volume.	From—	To—	Total.	Remarks.
XVIII	87760	87850	90	Volume now full.
XX	97462	97500	38	Do.
XXIII	106825	106856	31	Volume in use.
XXIV	112041	.....	.....	Reserved for fossils.
XXV	116920	120825	3,905	Volume now full.
XXVI	120825	122524	1,700	Volume in use.
Total for 1890-'91	.....	.....	5,764	

REPORT ON THE DEPARTMENT OF INSECTS IN THE U. S. NATIONAL MUSEUM, 1891.

By C. V. RILEY, *Honorary Curator.*

During the past fiscal year no important changes have been made in the exhibit collections of the Department, but the reserve collections in the laboratory have been steadily improved to facilitate the access, and increase the attractiveness and utility to students.

Many important accessions have been received during the year, of which the following are worthy of mention:

About 63 species of insects of all orders collected in Angola and St. Thome, Africa. from H. Chatelain, 219 Four and a half street, Washington, D. C. (Acc. 23400.)

A large collection of African insects of all orders from Dr. W. L. Abbott, 1926 Chestnut street, Philadelphia, Pa. These were collected mostly between Mombasa and Killima-Njaro, but many on the Seychelles Islands and on Madagascar. Of special interest is a set of beautiful leaf insects from the Seychelles. (Acc. 23656, 24008.)

Types of North American Geophilidæ mounted on eight microscopic slides, from O. F. Cook and G. F. Collins, Syracuse, N. Y. (Acc. 23854.)

Forty species of North American Coleoptera, new to collection, from Charles Palm, East Sixty-fourth street, New York. (Exchange.) (Acc. 23853.)

North American Noctuidæ, including types of ten new species from Prof. J. B. Smith, New Brunswick, N. J. (Acc. 23933.)

Collection of Lepidoptera, containing 382 North American and 62 European species, from the curator. (Acc. 23934.)

Fifty-four species of North American Coleoptera, new to collection, from the curator. (Acc. 23964.)

Through the curator, 355 species of mounted insects of varies orders from the United States and Mexico, collected by L. Bruner, Lincoln, Nebr. (Acc. 23974.)

One hundred and sixty-seven species of South African insects, mostly Coleoptera, from J. H. Brady, Cape Town. (Acc. 23982.)

Sixty species and 425 specimens of Lepidoptera, and 375 species, 2,400 specimens of Coleoptera, collected in the States of Washington and California by A. Koebele, and transferred to the National Museum by the curator. (Acc. 24017.)

A series of 400 species of Coleoptera and 130 species of Hemiptera, collected by L. Bruner in Western United States and Mexico, and transferred to the National Museum by the curator. (Acc. 34136.)

Twenty microscopic slides from Prof. J. B. Smith, New Brunswick, N. J., illustrating his essay on the mouth-parts of Diptera. (Acc. 24135.)

A collection of Tineidæ containing 430 species in 900 specimens of North America and 140 species in 500 specimens of Europe. This collection was purchased from William Beutenmüller, of New York, by the Agricultural Department, and deposited in the Museum. It contains the original types of all the species described by Mr. Beutenmüller. (Acc. 24277.)

REPORT ON THE DEPARTMENT OF MARINE INVERTEBRATES IN THE U. S. NATIONAL MUSEUM, 1891.

By RICHARD RATHBUN, *Honorary Curator.*

The curator is able to report favorable progress in the work of this department during the past year. Except for the temporary closing of the exhibition room, its affairs have never been in better condition, and much original research has been carried on.

The construction of a new roof over the west hall of the Smithsonian building has necessitated the removal of most of the collections stored there and the utilizing of the central part of the fish hall for display purposes on a small scale. The library and office room has, however, been accessible, and has been used as heretofore. The gallery assigned to this department has been better fitted up as a general work room by the transfer to other quarters of a part of the collections previously kept there and the introduction of many conveniences for the storage and assorting of collections. The small room in the west basement, hitherto used for the unpacking of alcoholic specimens and the storage of the type collections of that character, has been so darkened by the building of a large structure alongside its windows that it is no longer adapted to such purposes, and the overhauling of the alcoholics has to be done at present in the gallery.

All of the collections have been maintained in good condition, and the number of specimens has been considerably increased by additions from many sources. Much time has been occupied in the assorting, labeling, and cataloguing of specimens, and in the preparation of duplicate sets for gratuitous distribution and the exchanges. Original research has been limited chiefly to the higher crustacea, respecting which several papers are in course of preparation.

The curator has been unable to give more than a general supervision to the department during the year, the credit for the activity displayed being due to Mr. James E. Benedict, the assistant curator, and Miss M. J. Rathbun, who are responsible not only for the general conduct of the work, but also for the increased results herein recorded. Both have been engaged in working up and describing portions of the collections under their charge, thereby adding greatly to the scientific value of the latter, and bringing them to the attention of specialists and students of

natural history. During three months Mr. Benedict was attached as naturalist to the Fish Commission steamer *Fish Hawk* while making oyster surveys in Long Island Sound and on the coast of South Carolina, and in that connetion obtained many valuable additions to our collection in the way of obscure and little-known crustaceans. Mr. A. E. McConnell, a young draftsman, volunteered his services to the department during June, and was employed in making drawings and in other work.

The total number of accessions recorded has been 32, aggregating a much larger number of species and specimens than for the previous year. The contributions made by the Fish Commission have been chiefly in the line of the Crustacea, including 56 species of *Brachyura* and *Anomoura* dredged by the steamer *Albatross* chiefly in the Pacific Ocean, a collection of *Brachyura* obtained by the schooner *Grampus* on the red snapper banks of the Gulf of Mexico, and a very large series of specimens of the genus *Panopeus*, representing recent investigations by the Fish Commission vessels along the Atlantic and Gulf coasts of the United States. A number of Pacific Ocean *Echini* have also been deposited by the Commission.

Other large collections have been received as follows: From the British Museum, London, England, 95 species representing several groups of marine invertebrates, mostly obtained during the voyage of H. M. S. *Challenger* between 1873 and 1876; from the Imperial Museum of Natural History, Berlin, Germany, 86 species of echinoderms; from the Royal Zoölogical Museum, Copenhagen, Denmark, 85 species of marine invertebrates collected by the Danish Exploring Expeditions of 1882–'83, to the Arctic regions, Kara Sea, and the southern coast of Nova Zembla; from Dr. E. A. Andrews, Johns Hopkins University, Baltimore, Md., 57 species of annelids from Beaufort, N. C., and Willoughby Spit, Va.; from Prof. Henry A. Ward, Rochester, N. Y., a large series of crustaceans from several localities.

Many of the smaller accessions have also been of much value, the following among them being worthy of special mention: A series of marine invertebrates from St. Paul Island, Bering Sea, and Unalaska, collected by Mr. William Palmer, of the National Museum, and Mr. H. W. Elliott, during the summer of 1890; a similar collection from Arichat, Cape Breton, Nova Scotia, presented by Mr. W. A. Stearns, of Cambridge, Mass.; specimens of crustacea from Dr. Charles F. Newcombe, of Victoria, British Columbia, and obtained in that vicinity; entozoan parasites of fish-eating birds from Guaymas, Mexico, and crayfishes from North Carolina, donated by P. L. Jouy; a miscellaneous collection from C. R. Orcutt, of San Diego, Cal.; New Zealand sponges, crabs, and starfishes from Henry Edwards, of New York; Bahama starfishes from John I. Northrop, of Columbia College, New York; Samoan sponges, corals, and echinoderms from Lieut. T. Dix Bolles, U. S. Navy; crustaceans from the Florida Reefs, collected by Lieut.

J. F. Moser, U. S. Navy; ascidians, annelids, and shrimps, from Grand Manan, New Brunswick, presented by Dr. C. Hart Merriam, of Washington, D. C.; crustaceans and starfishes from the west coast of Africa, presented by H. Chatelain.

Prof. S. I. Smith, of Yale University, has sent to the Museum for study the collection of crustacea made in Bermuda during 1876 and 1877, by Dr. G. Brown Goode, and the specimens of *Panopeus* obtained by Fish Commission parties in the West Indies at different times. Prof. A. E. Verrill has returned a small lot of Fish Commission specimens, which have been stored in the Peabody Museum at New Haven, and has supplied for study the specimens of *Panopeus* belonging to that museum.

The Fish Commission collections of the higher Crustacea when received in Washington are temporarily deposited with this department to be assorted, catalogued, and prepared for study, and when identified are transferred to the Museum.

An unfinished manuscript report on the Decapod Crustacea, containing many valuable notes and a comprehensive bibliography of the subject, has been contributed by Prof. J. S. Kingsley, of the University of Nebraska. It will be of great service in the study of this group.

During the first part of the year the west hall of the Smithsonian Institution, used by this department for exhibition purposes, remained in the same condition as explained in the last report, but in preparation for the extensive repairs authorized by the last Congress, it became necessary to close the hall to the public in March, and to make suitable disposition of the collection which would soon have been damaged by the weather after the removal of the roof. The necessity for these repairs has been evident for a long time, and during a severe storm in August, 1890, many of the cases were fairly deluged with water, although fortunately none of the objects they contained were permanently damaged. The more hardy stony corals and sponges were left in the upright wall cases, which were closely boxed in such a manner as to insure the protection of the cases and their contents. The unit cases, together with the specimens stored in them, and the display collections of crustaceans, echinoderms, and gorgonians, as well as some of the stony corals and sponges, and the alcoholics, were transferred to the fish hall adjacent, where, in the limited space available, as instructive a display as possible has been made.

The gallery in the main hall, used as a workroom and storeroom, has been re-arranged so as to afford better facilities for study and the assorting of collections, while its ventilation has also been improved. The large number of dried sponges heretofore stored there, together with some additional specimens not requiring immediate attention, have been removed to two small rooms on the fourth floor of the south tower, where, although inconvenient of access, they are safe from injury. All other material has been placed in storage cases on the main

floor. This readjustment of the collections has made room for seven unit cases in the gallery, affording the means for disposing of most of the loose trays which had previously been stacked upon the floor. Three wall cases for alcoholic specimens have also been built in this gallery, and are now utilized for the type collections of Brachyura being studied by Mr. Benedict and Miss Rathbun.

The customary routine work of the department has occupied a large share of the time of the assistants. The collections received have been unpacked, assorted, and catalogued. Several sets of duplicate specimens for exchange and for gratuitous distribution have been prepared and sent out. The extensive collection of marine invertebrates made by the Fish Commission steamer *Albatross* on its cruise to Panama and the Galapagos Islands, during the winter of 1890–'91, was also partly assorted here, preparatory to the assignment of the different groups to specialists for study.

The researches made on the *Brachyura* and *Anomoura* have necessitated the overhauling of all the specimens belonging to those groups, and the extension and partial revision of the card catalogue descriptive of them. The card catalogue of the macruran and lower crustaceans has also been revised and brought down to date, and that of the annelids has been taken up for the same purpose. A few crustaceans have been mounted for the display cases, rather as an experiment, however, as it has not been deemed expedient to enlarge the exhibition series until the west hall is again made ready for occupation.

The amount of cataloguing done during the year is explained in the following table:

Group.	Entries to June 30, 1890.	Entries to June 30, 1891.	Number of entries made during year.
Crustaceans	14,934	15,814	880
Worms	4,810	4,935	125
Bryozoans and Ascidians	2,844	2,869	25
Echinoderms and Cœlenterates	17,459	17,640	181
Sponges and Protozoans	6,287	6,315	28
Total			1,239

Mr. Benedict has continued his studies upon the *Brachyura* and *Anomoura* belonging to the department, assisted by Miss Rathbun. This collection is one of the largest and most important of its kind that has ever been brought together, representing all parts of the world, but being especially rich in specimens from the coasts of the United States and the deeper waters adjacent to them. Until a year ago, this rich field had received very little attention in the department, and much time has naturally been consumed in overhauling and assorting the specimens, and in identifying those which had previously been described. It was considered important to complete the general revi-

sion of the material before beginning upon the study of special groups, in order to prepare good reference series and determine the direction in which the best results could be obtained. This preliminary work has practically been finished and much progress has been made in the writing of special monographs, and the description of new and obscure forms. At the same time the specimens have been placed in good condition, the labels and catalogues perfected, and the collections conveniently arranged.

One monograph was completed within the year and accepted for publication in the Proceedings of the Museum. It is a joint paper by Mr. Benedict and Miss Rathbun on the genus *Panopeus* of crabs, a genus which has long needed the careful revision it has received at their hands. It is represented in the Museum by about three thousand specimens, belonging to twenty-four species, of which six were found to be new and undescribed. Material for the work was also obtained from other sources, including the specimens belonging to the Yale University Museum, furnished by Prof. A. E. Verrill, the Bermuda collection of Dr. G. Brown Goode, and the Brazilian collections of the Hartt expeditions. Each species was reproduced by means of outline drawings or photographs, but the latter proving unsatisfactory for engraving, pen and ink sketches have been made from them. A complete bibliography of the genus was prepared in connection with the paper.

Mr. Benedict is now engaged upon a monograph of the genus *Eupagurus* which already numbers sixty species in our collection, many of them, especially from recent explorations by the steamer *Albatross* in the Pacific Ocean, being new to science. All of the principal museums in the country will be drawn upon for material in the preparation of this paper, in order that it may be made as complete as possible. Miss Rathbun is at work upon a descriptive catalogue of the Family *Periceridæ*, represented in the National Museum by eleven genera and forty-eight species, of which fifteen species have never been described.

The crabs collected by the steamer *Fish Hawk* on the coast of South Carolina and in Long Island Sound, in connection with the oyster investigations of the past two years, have been named, and lists of the same furnished to the Fish Commission. Mr. Benedict has also given some time to the preparation of notes to be embodied in a handbook of instructions for the collecting of marine invertebrates.

The studies of Mr. W. C. Kendall on the zoölogical collections made by the Fish Commission schooner *Grampus* in the Gulf of Mexico in 1889, described in the previous report, were continued a short time into the present year.

A collection of entozoan parasites from fish-eating birds, collected at Guaymas, Mexico, by P. L. Jouy, was referred to Prof. Edwin Linton, of Washington and Jefferson College, Washington, Pa., who has reported upon them in a paper which will appear in Vol. XV, of the Proceedings of the Museum.

A report by Dr. E. A. Andrews on the marine annelids of Beaufort, N. C., and Willoughby Spit, Va., may also be referred to in this connection, although the material described was not furnished by this department. A full set of the species was, however, presented to the Museum by Dr. Andrews, and his paper will be printed in its proceedings.

All of the unnamed specimens of stomatopods in the collection, as well as some others, have been referred to Dr. Robert P. Bigelow, of Johns Hopkins University, who is now preparing an extensive paper on the group. The specimens of the *Oniscidæ* have been referred for study to Messrs. O. F. Cook and H. R. Jaquay, of Syracuse University; and also many lots of the Foraminifera from the dredgings of the *Albatross* and other vessels, to Dr. James M. Flint, U. S. Navy.

Nine of the regular sets of duplicate marine invertebrates belonging to series No. IV have been distributed during the year. Each of these sets contains about one hundred and ten species, carefully preserved and labeled, as described in previous reports. The specimens were selected from collections made by the U. S. Fish Commission on the eastern coast of the United States, and represent all of the principal groups of invertebrates occurring in that region. The institutions supplied are as follows: Pennsylvania State College, Center County, Pa.; Brooklyn Training School, Brooklyn, N. Y.; Mount Vernon Seminary, Washington, D. C.; High School, Bridgton, Me.; Missouri Valley College, Marshall, Mo.; Columbia College, New York, N. Y.; Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La.; State Normal School, Milwaukee, Wis.: High School, Springfield, Mass.

Special collections have been sent out in exchange for other specimens or for purposes of study, as follows: To Prof. George S. Brady, Sunderland, England; the Imperial Museum of Natural History, Berlin, Germany; the American Museum of Natural History, New York, N. Y.; Prof. J. P. McMurrich, Clark University, Worcester, Mass.; John W. Spencer, Paxton, Ill.; Charles S. Beachler, Crawfordsville, Ind.; Dr. Stephen Bowers, Ventura, Cal.; the Brooklyn Institute, Brooklyn, N. Y.; Prof. Henry A. Ward, Rochester, N. Y.; Mount Vernon Seminary, Washington, D. C.

The principal explorations during the year by which this department has been benefited, were those made by the Fish Commission steamers *Albatross* and *Fish Hawk*, the former operating in the Pacific Ocean, the latter on the Atlantic coast of the United States. The steamer *Albatross* spent the summer of 1890 in Bering Sea, going north in May and returning to San Francisco in September. The object of this cruise was to determine the fishing resources of the southeastern part of Bering Sea, and the location, extent, and characteristics of the cod and halibut banks. Many dredgings were made over this area, both in shallow and deep water, and large collections of natural-history speci-

mens were procured. The brachyuran and anomouran crustaceans have been referred to Mr. Benedict for study. In January, 1891, the *Albatross* proceeded southward, and under the direction of Prof. Alexander Agassiz, made a careful biological survey of the region lying off Panama and about the Galapagos Islands, running several lines of deep-sea dredgings, and carrying the observations over the plateau in shallow water adjacent to the continent. No similar investigations had been conducted in this part of the Pacific prior to the visit of the *Albatross*, except close along the coast, and very important scientific results were therefore obtained. The natural-history collections will be studied under the supervision of Prof. Agassiz, after which the type series of specimens will be deposited in the National Museum.

The *Fish Hawk* was engaged during the summer of 1890 in an investigation of the oyster grounds of Long Island Sound, in which Mr. Benedict participated for about eight weeks. During the winter and early spring of 1891, the same vessel made a survey of the natural oyster beds of the coast of South Carolina, Mr. Benedict again being a member of the scientific party. Neither of these explorations by the steamer *Fish Hawk* afforded opportunity for making extensive collections of marine invertebrates, but in South Carolina, especially, many obscure forms were obtained from the brackish waters which had previously been little studied.

REPORT ON THE DEPARTMENT OF COMPARATIVE ANATOMY IN THE U. S. NATIONAL MUSEUM, 1891.

By FREDERIC A. LUCAS, *Assistant Curator.*

During the past year the specimens collected for this department by the Eclipse Expedition of 1889–'90 have been identified and catalogued, and some necessary work was done on vertebrate fossils.

A large portion of the time of the assistant curator has been occupied in drawing up a tentative plan for a synoptic exhibition series of invertebrates, mounting the specimens, and writing labels for the portion arranged. Labels needed for the exhibition series of skeletons, and for the specimens of domesticated animals, have also been prepared, and the work of labeling the exhibition series of vertebrate fossils was commenced.

Nine small lots of specimens of fossil and recent bones have been submitted and identified. Many specimens have been lent to Dr. R. W. Shufeldt for study in connection with the preparation of a work on the osteology of North American birds. Skulls of various fishes were prepared for the use of Dr. Gill, and a series of bones of Rhytina was selected for the Museum of Comparative Zoölogy.

The more important accessions during the year were a small collection of North Bornean birds, containing some important desiderata, and a collection of birds made by Mr. Wm. Palmer at the Pribylof Islands. The additions to the exhibition series have been mainly skeletons of such birds as were needed to complete the representation of important groups. Three species of Galapagos Tortoises were also mounted. It is gratifying to report the continued growth of the study series of osteological specimens, especially of mammals and birds, although it is to be regretted that, owing to lack of sufficient space and of the necessary time, it is impossible to properly arrange them. Were space available, six months' time, or more, could be profitably spent on the birds alone, as this part of the collection represents the accumulations of years, and includes much material still unclassified.

No special researches have been made in this department during the year, with the exception of a careful study by the assistant curator of the osteology of the Family *Paridæ* and some of its allies. He has also

availed himself of the Museum material to study the structure of the tongue of humming birds, and has prepared for incorporation in a handbook of the *Trochilidæ*,* a chapter, with illustrations, on the anatomy of that group.

The directions for collecting skeletons, published in the proceedings for 1885, have been rewritten and extended.

The following table shows the increase during the year as indicated by the catalogues:

Class.	Last entry June 30, 1890.	Last entry June 30, 1891.	Increase.
Mammals	34,737	35,144	407
Birds	18,743	18,982	239
Reptiles and batrachians	29,291	29,300	9

On June 30, 1891; there were 577 specimens on exhibition, as follows:

Skeletons:	
Mammals	196
Birds	71
Reptiles	47
Fishes	25
Skulls of mammals	58
Specimens illustrating points of morphology, structure, etc	180
Total	577

* See Report National Museum, 1890.

REPORT ON THE DEPARTMENT OF PALEOZOIC INVERTEBRATE FOSSILS IN THE U. S. NATIONAL MUSEUM, 1891.

By C. D. WALCOTT, *Honorary Curator.*

The year's work, in its bearings upon the collections, has been indirect rather than direct, owing to the necessity for the completion of certain publications by the curator for the U. S. Geological Survey prior to the meeting of the Geological Congress in August next. A large amount of material was received from the collectors of the Geological Survey, but owing to the pressure of other duties it has not been transferred to the Museum. During the past winter Mr. S. Ward Loper has been engaged for several months working upon the accessions and preparing them for the exhibition series; and there is now a large amount of material that will be available whenever case room is provided for it. Mr. Charles R. Keyes was employed during the spring to revise the exhibition series of Carboniferous fossils, and to bring the nomenclature in accord with the latest authorities. Many of the labels in the general collection had been badly written, and Mr. Oscar Hinrichs has been employed for the past six weeks in rewriting them.

As a whole, the year's work shows substantial progress, and this will be more specifically recorded in the report for the ensuing fiscal year.

The two most important accessions during the year are those from the Geological Survey of Sweden and Mr. Thomas Ruddy, of Wales. The Cambrian collection from the Geological Survey of Sweden will be of great value to all American students who are interested in studying the Cambrian fauna and wish material from Sweden for comparison. The collection of Mr. Thomas Ruddy is one of the most noted in Europe from the Bala series of rocks, and his generous presentation of forty-four genera and eighty species to the collections of the National Museum will enable students to make direct comparison between the English and American upper Ordovician faunas.

The amount of the material in the collections was increased by the addition of 615 specimens, carrying 84 genera, 153 species, and 1 variety.

The catalogue numbers taken up during the year were from 24058, both inclusive.

Notices of the publications by the members of this department during the year will be found in the Bibliography (Section IV).

It is very difficult to handle the large amount of material coming in from the Geological Survey and other sources, owing to the limited laboratory room. Over fifty packing boxes of material, collected by the Geological Survey, have been put in storage on account of the necessity of obtaining room for collections that needed immediate study. This was in order that reports might be made to the geologists of the Geological Survey who desired to use the information in connection with their field work. It will not be possible to make a detailed report on the collections or to separate the duplicates until much greater facilities shall be had for handling them.

ACCESSIONS TO THE COLLECTION.

HON. JOHN H. GEAR (Burlington, Iowa): A specimen of Crinoid, from Lower Carboniferous, Keokuk group, near Keokuk, Iowa. Acc. 23342.

MAJ. J. W. POWELL (Director U. S. Geological Survey, Washington, D. C.): Two species of Crinoids (Ordovician System, Trenton formation), presented by John Stewart, esq., to Maj. Powell, and by the latter to the U. S. National Museum. Acc. 23361.

F. H. LUTHE (McGregor, Iowa): Corals: Favosites, Acervularia, and Lithostrotian (Devonian System, Hamilton formation.) Acc. 23388.

OSCAR POTTER (Scott, Cortland County, N. Y.): Orthoceras (Devonian System, Chemung formation.) Acc. 23609.

MRS. HELENA B. WALCOTT (Washington, D. C.): One hundred and eighty-six specimens, including slabs with numerous shells, etc., from the Oriskany sandstone of New York. (Silurian; Oriskany formation.) Acc. 23647.

PROF. ORVILLE A. DERBY, Rio Janeiro, Brazil (through Prof. J. M. Clarke, Albany, N. Y.): Fossils of the Devonian System: *Proetus pullinus* Clarke; *Cryphæus paituna* H. & E. (1 cast); *Homalonotus acanthurus* Clarke (1 cast); *Homalonotus ciara* H. & Rathbun (1 cast); *Homalonotus derbyi* Clarke (1 cast); *Phacops brazilliensis* Clarke (1 cast); *Phacops mcnurus* (1 cast); *Phacops macropyge* Clarke (1 cast); *Dalmanites tumilobus* Clarke (1 cast); *Dalmanites gemellus* Clarke (1 cast); *Dalmanites australis* Clarke (cast); *Dalmanites scirpeus* Clarke (cast); *Dalmanites maccurua* Clarke (4 casts); *Dalmanites galea* Clarke (2 casts). Acc. 23682.

F. LINSLEY (Farmdale, Trumbull County, Ohio): Ten specimens of fossils (Silurian System, Hudson formation) from upper beds of the Cincinnati group, at Richmond, Ind.; *Monticulipora, Orthis, Rhynchonella, Streptelasma*, and *Protaria*. Acc. 23683.

JAMES W. ROGAN (Amis, Hawkins County, Tenn.): Two blocks (Silurian, Hudson formation), one containing *Scolithus* borings, the other casts of worm holes or of marine algæ (Fucoid). Acc. 23696.

PROF. R. T. HILL (Austin, Texas): Fossils representing the Lower Carboniferous from historical localities in Burnet County, Tex. Acc. 23700.

[illegible] OF NEW BRUNSWICK, (Fredericton, New Brunswick): Specimens from [illegible]niferous, and Ordovician. Acc. 23713.

JOHN W. LANGDALE (48 K street, Washington. D. C.): Two Oriskany fossils (unidentified). Acc. 23907.

ADAM FISHER (Moorfield, Hardy County, W. Va.): Silurian Oriskany fossil (unidentified). Acc. 23908.

J. MILTON FINCH (217 Bainbridge street, Dayton, Ohio): Silurian segments of Crinoid columns. Acc. 23917.

DR. C. HART MERRIAM (Department of Agriculture, Washington, D. C.): Nine fragments of corals. Acc. 23920.

U. S. GEOLOGICAL SURVEY (through Charles D. Walcott, in charge of Division of Paleozoic Invertebrate Paleontology): This accession contains one specimen of *Glyroceras*, from the Lower Corboniferous, and four specimens of Devonian fish remains, from Scotland. Acc. 24211.

J. H. LEMON (New Albany, Floyd County, Ind.): Referred to Prof. H. S. Williams, Ithaca, N. Y., for identification and report. Acc. 24233.

GEOLOGICAL SURVEY OF SWEDEN (Stockholm, Sweden): Cambria Fossils: *Medusites radiatus; Medusites lindstromi; Medusites favosus; Mickwitzia monilifera; Protospongia fenestrata; Dictyonema flabelliforme; Acrothele coriacea; Acrothele granulata; Lingulella nathorsti; Hyolithes socialis; Hyolithes tenuistriatus; Leperditia primordalis; Beyrichia angelini; Agnostus nathorsti; Agnostus parvifrons; Agnostus pisiformis; Agnostus gibbus; Agnostus fallax; Agnostus punctuosus; Agnostus intermedius; Agnostus lavigatus; Agnostus glandiformis; Agnostus fissus; Agnostus rex; Agnostus regius; Solenopleura brachymetopa; Solenopleura parva; Solenopleura cristata; Conocoryphe dalmania; Conocoryphe exsulans; Conocoryphe agraulus; Liostracus linnarssoni (Hyolithes socialis); Anomocara excavatum; Anomocare limbatum; Arionellus primavus; Ellipsocephalus nordenskioldi; Ellipsocephalus polytomus; Cyclognathus micropyqus; Parabolina spinulosa; Olenus truncatus; Paradoxides sjogreni; Paradoxides tessini; Olenellus kjerulfi; Orthis lindstromi.* (Acc. 24324).

THOMAS RUDDY, ESQ. (Pale Cowen, Wales): Ordovician Fossils: *Orthis biforata; Orthis actoniæ; Orthis alternata; Orthis ascendens; Orthis calligramma; Orthis elegantula; Orthis flabellulum; Orthis Kirnantensis; Orthis sagittifera; Orthis spiferoides; Orthis vespertilis (alternata); Orthis vespertilis; Strophomena deltoidea; Strophomena depressa; Strophomena expansa; Strophomena grandis (deltoides); Strophomena pecten; Pterinea pleuroptera; Modiolopsis inflata; Modiolopsis modiolaris; Modiolopsis pyrus; Euomphalus sculptus; Glyptocrinus basilis; Cyclonema crebristia; Holopea conica; Holopea exserta; Holopea striatella; Holopella* sp.; *Ctendonta varicosa (Bellerophon carinatus); Murchisonia simplex; Trochonema tripocata; Orthisina ascendens; Favosites asper; Favosites gothlandica; Stenopora fibrosa; Stenophora lycoperdon; Halysites catenularius; Heliotites interstinctus; Heliotites tubulatus; Petraia æquisulcata; Petraia subduplicata; Echinosphærites balthicus; Echinosphærites granatus; Nebulipora lens; Sphæronites pyriformis; Sphæronites punctatus; Sphæronites munitus; Cythere umbonata; Asaphus powisii; Serpulites* sp.; *Calymene sanaria; Encrinurus sexcostatus; Trinucleus concentricus; Trinucleus seticornis; Homalonotus bisulcatus; Lichas laxatus; Pinnatoporo sedgwickii; Phyllopera hisengeri; Ptylodictya costellata; Ptylodictya dichotoma; Ptylodictya explanata; Crania divaricata; Leptæna quinquicostata; Leptæna sericea; Leptæna scissa; Leptæna transversalis; Leptæna tenuicincta; Lingula ovata; Meristella crassa; Bellerophon bilobatus; Bellerophon nodosus; Conularia sowerbyi; Cytoceras sonax; Retiolites geinitzianus; Annelid burrows; Graptolithus priodon; Glauconome disticha; Orthoceras ibex; Orthoceras primævum; Orthoceras vagans.* (Acc. 24325).

Examinations and reports were made upon the accessions carrying the following numbers: 936, 949, 1051, 1071, 1076, 1092, 1119, and 1186.

Work upon accessions Nos. 19896, 21286, and 23249, which belong to previous years, was completed, and they were transferred to the Museum collections.

Recapitulation of accessions.

Accession number.	No. of genera.	No. of species.	No. of varieties.	No. of specimens.
23342	1	1	.....	1
23361	1	2	.....	2
23388	4	5	.....	7
23609	1	1	.....	1
23647	(a)	.....	.....	186
23682	5	14	1	37
23683	1	1	.....	2
23696	2	2	(2 blocks)	2
23700	(a)	.....	.....	.....
23712	(b)	.....	.....	10
23886	1	1	.....	1
23907	(a)	.....	.....	10
23908	(a)	.....	.....	1
23917	(a)	.....	.....	.....
23920	(b)	.....	.....	9
24211	2	2	.....	5
24233	.....	.....	.....	.....
24324	22	44	.....	109
24325	44	80	.....	252
Total	84	153	1	615

(a) Not examined.
(b) Of little paleontological value.

REPORT OF THE DEPARTMENT OF MESOZOIC FOSSILS IN THE U. S. NATIONAL MUSEUM, 1891.

By C. A. WHITE, *Honorary Curator.*

Since the whole personnel of this department are members of the U. S. Geological Survey, their labors have been primarily devoted to that organization, but all the work which has been done on the fossil collections has been in direct line with that of the Museum. Besides this, a considerable amount of routine work, pertaining specially to the Museum, has been accomplished.

The fossil collections of this department are steadily increasing, and have now become very important. They also have been lately rearranged in the cases, with reference to the installation of the exhibition series. They are now in better condition for examination and study than they have ever been before.

Because of the nature of the collections, and of the little time for that purpose at the disposal of the members of this department, it has been impracticable to satisfactorily divide the specimens into reserve, exhibition, and duplicate series. Some attention, however, has been given to the selection of a series for exhibition, as already indicated, but much study must be given to all the material before any further division can be made.

The entries in the Museum catalogue range from 20263 to 21751, making 1,488 entries, and adding 8,449 specimens to the Museum collections during the year.

It has already been stated that all the work of this department has been performed by members of the U. S. Geological Survey. The resignation of Dr. C. B. Boyle, who for the past seven years has done the greater part of this work, will make it impracticable in the future to bestow so much time upon this work as has been done in the past, unless more assistance is obtained from the Survey.

In the Bibliography (Section IV) will be found references to three papers published by the curator during the year, the first two of which have reference to Museum material.

REPORT ON THE DEPARTMENT OF BOTANY IN THE U. S. NATIONAL MUSEUM, 1891.

By GEORGE VASEY, *Honorary Curator.*

The report now presented constitutes my third annual report relating to the National Herbarium. The growth of the Herbarium during the past year has been very marked, the number of mounted sheets added being 50 per cent more than last year, and the accessions both in number of packages and of specimens having been doubled.

ACCESSIONS.

The accessions received during the year ending June 30, 1891, number 622, of which 44 were received through the National Museum, the rest chiefly from collectors employed by the Department of Agriculture. The following are among the most important:

A collection of 10,000 specimens made by Dr. Edward Palmer, who was employed as special agent of the division of botany in western Mexico, mostly in the States of Sonora and Colima.

A set of 276 species from Capt. J. D. Smith, collected by him in Guatemala and donated to the herbarium.

Two sets of 300 species each, collected by C. G. Pringle in Mexico, one obtained by purchase, and one through the Smithsonian Institution.

A collection of 1,243 specimens of east Florida plants, collected by J. H. Simpson, a special agent of the division of botany.

A collection of 1,249 specimens of plants from western Texas, made by G. C. Nealley, a special agent of the division.

A collection of 1,935 specimens of South American plants obtained by purchase from Dr. H. H. Rusby.

A collection of 1,707 species, mostly from Minnesota, obtained by purchase and donation from J. M. Holzinger.

A collection of 2,216 plants made by Jesse Holmes, a special agent in eastern Maryland and New Jersey.

A collection of 7,600 specimens from the Death Valley region, of California, and of Nevada and Arizona, made by Frederick V. Coville and Frederick Funston, who were special agents of the division of botany.

A set of 300 species of South American plants obtained by purchase from Dr. Thomas Morong.

A miscellaneous collection of about 850 plants obtained by donation and exchange from Dr. N. L. Britton.

A collection of 2,318 specimens from Minnesota made by Dr. J. H. Sandberg, who was employed as special agent.

A set of 130 species of Washington plants from Mr. Suksdorf, obtained by purchase.

A collection of about 200 specimens obtained by Mr. L. H. Dewey in Texas and Arizona.

A collection of about 300 specimens from F. W. Thurow, of Texas.

A collection of about 200 species received in exchange from the California Academy of Sciences.

A set of 300 species obtained by Mr. Dan. McDougel in Arizona, who was employed as special agent.

A large collection of mosses and hepaticeæ, numbering above 2,000 specimens, has been received from Dr. L. M. Underwood; also ten decades of United States hepaticeæ

Accessions received during the year through the Smithsonian Institution.

Date.	Accession number.	Sender.	Number of specimens.	Date.	Accession number.	Sender.	Number of specimens.
1890.				1890.			
July 2	*796	A. G. Sanders.....	3	Dec. 30	23871	Mrs. S. E. Steinweg.	133
12	23356	C. E. Pleas.....	7				
12	*803	A. J. Williams....	1	1891.			
19	23390	H. M. Smith	10				
23	23400	H. Chatelain.....	3	Mar. 24	24131	Miss B. C. Grinman	1
Aug. 5	*826	A. J. Scott.....	1	Apr. 4	24161	G. A. Allen	47
9	*836	E. F. Beale.....	22	May 12	*1117	F. C. Van Vliet...	1
9	*837	G. M. Miller	1	13	*1127	E. Stevenson.....	6
15	23446	F. E. Engelhardt..	1	13	*1132	A. A. Everts.....	1
15	23445	P. L. Jouy	27	13	24307	Mrs. C. M. Ferry..	7
19	*847	W. A. Coffe.....	1	June 1	*1159	J. W. Meeker.....	1
19	23461	H. M. Smith	22	2	24404	R. B. Olat	1
Sept. 11	23508	....do	19	4	24330	E. M. Tauber.....	1
11	23515	C. B. Bagster.....	1	5	*1181	D. J. Page.....	4
19	23537	Thomas Christy ..	2	6	*1141	C. S. West.....	1
25	*987	J. S. Romer	1	6	24436	Elmer Rambo.....	3
26	*901	F. C. Knowles.....	4	11	*1193	E. W. Screvers....	17
Oct. 8	23619	W. J. Spillman....	55	12	24453	Otto Vesterlund ..	2
15	23636	C. B. Going	1	13	*1199	E. Stevenson.....	1
18	*920	J. F. Oliver	1	23	*1227	J. L. Mitch	
27	23662	W. A. Stearns	3	23	1223	C. L. Rogan	
Nov. 14	*938	J. W. Meeker.....	1	30	1243	J. S. Marsh.....	
Dec. 1	23778	I. Hagen.....	37		44		
12	23818	R. E. Giebner.....	1				
27	23857	Government Gardens, India.	910				

*Primarily sent for examination and report.

Of these forty-four accessions from the Smithsonian Institution following are the most important:

No. 23857, a collection of 910 species of dried plants from the Botanic Garden, Calcutta, India, sent through Dr. G. King, superintendent of the garden.

No. 23871, a collection of 37 species of Norwegian mosses from

No. 24453, a collection of 25 species of Florida plants from Dr. Otto Vesterlund, Edepors, Sweden.

(No. 23871 was a collection of Washington State plants sent for identification and returned.)

The total number of plants received from all sources is 40,963. The number of specimens mounted and distributed into the collection is 8,945, of which 2,538 are mosses and liverworts. The number of packages sent out from the Herbarium was 155, containing 8,059 specimens.

The number of plants remaining in the duplicate collection is about 40,000.

A list of the botanical papers published by the curator and by other collaborators will be found in the Bibliography (Section IV).

Statement of the number of specimens distributed since July 1, 1889, from the duplicates of the National Herbarium.

July 1, 1889 to July 1, 1890:	
To agricultural colleges	2,019
To other institutions and botanists	5,932
Total	7,951
July 1, 1890 to July 1, 1891:	
To agricultural colleges	3,694
To other institutions and botanists	4,762
Total	8,456
	7,951
Grand total	16,407

REPORT ON THE DEPARTMENT OF FOSSIL PLANTS IN THE U. S. NATIONAL MUSEUM, 1891.

By LESTER F. WARD, *Honorary Curator.*

The work during the year has been devoted almost entirely to the installation and care of specimens, and the collections are now in better condition, for purposes of consultation and study, than ever before.

IMPORTANT ACCESSIONS.

Undoubtedly the most important accession during the year is a collection of Dakota plants sent by Prof. F. H. Snow, of the University of Kansas. This collection, which embraced 135 specimens, representing 75 species, consists of especially fine specimens from the Dakota Group of the central and western counties of Kansas, and had all been determined by Prof. Leo Lesquereux. A few are type specimens and many are duplicates of types used by Prof. Lesquereux in preparing his elaborate flora of the Dakota Group about to be published by the U. S. Geological Survey.

Another highly important collection was that made by Capt. Bendire in 1883, but now for the first time studied and identified. This collection, which embraces over 700 specimens and 150 species, was made by Capt. Bendire, at Bridge Creek, Wasco County, Oregon, and had been placed in the hands of Prof. Lesquereux for determination. Several new species were detected among them, as well as others of considerable interest. While not in the strictest sense a new accession, this collection may be so regarded, since it first became available for study during this year.

Collections or specimens of more or less importance were also received from Mr. John N. Sage, Mr. G. van Ingen, Mr. Thomas Charlton, and Messrs. J. S. Diller and J. Stanley-Brown.

ROUTINE WORK.

During the early part of the fiscal year the Museum was without an assistant for this department.

The first week in August I spent in company with Mr. David White

in the study of the Cretaceous fossils of Martha's Vinyard and adjacent islands. I then joined Prof. William M. Fontaine, and with him made a careful examination of the Triassic formation in the Connecticut Valley, extending the investigation to the northern limit of the Trias at Gill, Mass., and returning to Washington on September 1. During the spring months much time was spent in studying the Potomac formation, as exposed in the vicinity of Washington. The office work has been mainly the determination of fossil plants, being especially a continuation of my investigation of the flora of the Laramie Group.

Early in November, 1890, the services of Mr. Benedict Juni were secured, and from that time until May 1, 1891, he was constantly engaged upon the collections. The first work was a thorough rearrangement of all the Cretaceous and Tertiary specimens. These had at first been arranged systematically without regard to horizons, but are now arranged geographically and also systematically under each geological group, so that a student wishing to see all the specimens from any one locality can now find them together. The species were carefully fitted into small pasteboard trays, and these economically into the regular unit drawers. A complete label was printed on the typewriter for each species, which was supplemented by a card catalogue arranged alphabetically under localities, so that it is now possible to find, by the aid of the catalogue and the clearly printed labels, any specimen or species that may be desired.

Similar work was also begun for the Carboniferous material, and many labels were written, but this was not completed.

For a short time during the early part of the year Mr. Th. Holm was engaged in making an exchange of plants with the Stockholm Museum, selecting for this purpose some 800 species; but this important work was discontinued, as he was later transferred to another department.

The months of July and August were spent by Mr. David White in working out the stratigraphy of Martha's Vineyard, especially that portion proved by him to be Cretaceous, and in tracing the connection between the eastern outcrop of the Cretaceous clays through the intervening islands to the Amboy region of New Jersey. The remainder of the year has been occupied by him chiefly in work on the Carboniferous plant collections of the U. S. Geological Survey and U. S. National Museum. The report of the extensive collection made by Dr. W. P. Jenney, of the Geological Survey, is nearly finished, and will be published as an illustrated bulletin of the Survey. In addition to current work on other collections, a portion of his time has been engaged in increasing and perfecting his "Bibliography of Paleobotany." He has published numerous reviews of paleobotanical memoirs in the American Journal of Science and the Botanical Gazette.

Mr. Charles S. Prosser spent part of July and August in field work on the Devonian of eastern New York, and determined that the Hamilton fauna of that region is succeeded by the fauna and flora of the

Catskill, the Portage and Chemung faunas being absent. He also spent November and December in field work in the novaculite area of western central Arkansas. In the office his time has been devoted largely to the preparation of a paleobotanical species index. During the year he has published two papers, which are based upon U. S. Geological Survey and Museum material.

Mr. F. H. Knowlton spent the months of July, August, and September in the Gallatin Valley, Montana, near Yellowstone National Park, where he made collections of fossil wood and plant remains from the Cretaceous. He has also continued his studies on fossil wood, and has in preparation a paper on Paleozoic woods. During the latter part of the year he devoted considerable time to the study of the cryptogams, conifers, and monocotyledons of the Laramie Group, especially as represented in a large collection made in the vicinity of Denver, Colo.

Prof. William M. Fontaine, of the University of Virginia, has examined and reported upon a small collection of Triassic plants from New Mexico, detecting among them 3 new species. He has also completed his studies of the Potomac flora, and the very large series of specimens will soon be turned over to the National Museum.

REPORT ON THE DEPARTMENT OF MINERALS IN THE U. S. NATIONAL MUSEUM, 1891.

By F. W. CLARKE, *Honorary Curator.*

The growth of this department during the year has been satisfactory and steady, although no very great additions were made to the collection.

The routine work of cataloguing, labeling, packing, etc., has occupied most of the time of the assistant curator, Mr. W. S. Yeates. In addition to this, a nearly complete rearrangement of the systematic exhibition series was carried out during the early spring. In rearranging the collection the miscellaneous minerals bequeathed to the Museum by the late Isaac Lea were distributed throughout the regular series, and the entire mass of material was thoroughly culled over. The display was thus rendered much more effective than it had been, and the appearance of the mineral hall is greatly improved.

Technically speaking, the accessions to the collection have been only moderate. A reasonable number of additions were made by exchange, gift, and purchase, but only three accessions were particularly notable. These are, first, a collection of 171 Russian minerals, presented by Mrs. Mary I. Stroud; secondly, 53 Freiberg minerals received in exchange from the depository of the Royal Saxon Mining School; and, thirdly, a superb series of specimens from the Broken Hill mines in Australia, given by Mr. Walter J. Koehler. The last-named collection consisted mainly of the species silver, copper, bromyrite, cerargyrite, cerussite, and chrysocolla, the bromyrite and cerussite being finer than anything of the kind that I had previously seen.

Outside of the legitimate increase in the collection proper, several *quasi* additions to it may be fairly noted here, consisting of minerals bought for use in the proposed exhibit of the Museum at the World's Columbian Exposition. The most important of these was the gem collection of the late Joseph Leidy, containing about 400 cut stones, some of them of exceptional beauty. Other fine lots were obtained from dealers, but none of this material can be regularly absorbed into the collection until the object of the purchases has been fulfilled.

The present state of the exhibition series of minerals may be summarized statistically as follows: Meteorites, including the Shepard collec-

tion, 617 pieces and 9 casts, with 258 falls represented. Gem collection, 1,486 specimens, mostly cut stones, and 17 glass models. Systematic mineral series, 3,728 specimens. In special cases outside of the regular system, 976 specimens. In all, 6,824 specimens are now displayed. The number in the duplicate and reserve collections can not be easily estimated, for part of the material is in storage and other portions are as yet not definitely assigned to either series.

In all, 1,132 entries were made in the catalogue of the department during the year, covering 7,315 specimens.

Last catalogue number in June, 1890	49,056
Last catalogue number in June, 1891	50,188

REPORT ON THE DEPARTMENT OF GEOLOGY IN THE U. S. NATIONAL MUSEUM, 1891.

By GEORGE P. MERRILL, *Curator.*

Work on the economic section of the department has consumed a very large share of the energies of the curator and the assistants throughout the entire year, though during the month of June we have been able to devote a little attention to the systematic series. This work has been in many cases discouragingly slow, partly from the fact that we have for years been burdened with a vast quantity of undesirable material, which has been a long time accumulating, though in large part an inheritance from the International Exhibition at Philadelphia in 1876.

Matters had at last arrived at that stage where no satisfactory progress could be made, owing to the congested condition of storage and exhibition space. I have, therefore, gone systematically through the entire collections, so far as contained in the Museum building, carefully sifted out the undesirable material, identified, labeled, and classified such as was to be retained, and after trimming, cleansing, and numbering, had it installed in its proper shape. The amount of routine gone through with in this work can be appreciated by no one who has not had a similar experience. We have, however, the satisfaction of feeling that the department has at last emerged into a systematic series of collections, designed to show something regarding the earth's structure and history and the extent to which its resources are utilized by man. It is not meant by this to claim that the department is thoroughly organized, or by any means in a perfectly satisfactory condition, but we have at least arrived at that stage whereby the public may gain some tangible idea of the work we are trying to do. The system employed in arranging these collections has been given in sufficient detail in a preliminary handbook published in the Report of the National Museum for 1890, and need not be further referred to here.

One hundred and nineteen accessions and one hundred and thirty-two lots of specimens forwarded for examination have been received during the year, the former comprising upwards of 1,000 specimens. With a few exceptions, noted below, these have been comparatively unimportant. This may be explained by the fact that no money has

been devoted either to purchasing or collecting, and we had to rely on donations and exchanges. Of those who have exerted themselves to obtain for us material, and to whom especial thanks are due, Mr. J. H. Huntington, of Hyde Park, Mass., and Mr. F. W. Crosby, of this city, should be mentioned. Mr. J. P. Iddings, while in Italy, kindly arranged for us an exchange of materials with Dr. H. H. Johnston-Lavis.

The principal accessions are given in the subjoined list:

A collection of some 98 eruptive metamorphic rocks and volcanic products from various European sources, received in exchange for other materials from Dr. H. H. Johnston-Lavis, of Naples, Italy.

Some 45 specimens European volcanic rocks received in exchange from Mr. W. H. Hobbs.

Some 117 specimens of general geological materials received in exchange from B. Sturtz, Bonn, Prussia.

A collection comprising phosphates, and gold and platinum ores from Colombia, South America, and Grand Connetable, French Guiana. Gift of Mr. Charles Bullman, of Plainfield, N. J.

A fine series of Black Hill tin ores, the gift of Titus Ulke, jr.

Ten samples of manganese ores from Crimora, Va., the gift of William Carnegie.

A small series of natural hydrocarbons from Utah, the gift of G. C. Hewett.

A beautiful volcanic bomb from the islands of Lipari, showing the so-called bread-crust structure. Gift of Mr. J. P. Iddings.

A small series of phosphates from the Navassa Islands. Gift of Mr. E. V. D'Invilliers.

A small series of eruptive and stratified rocks from the De Beers diamond mine, South Africa.

A fine large series of phosphates from Dunellon, Fla. Gift of Dr. C. N. Sheppard, jr.

A collection of ores and building stones from New Mexico. Gift of Prof. J. H. Huntington.

Samples of infusorial earth from South Beddington, Me. Gift of Mr. C. E. Mitchell.

A large study series of ores and rocks illustrating the quicksilver deposits of the Pacific slope as described by G. F. Becker and colleagues. Received from the U. S. Geological Survey.

A series comprising nearly 200 eruptive and other rocks from Michigan. Received from Dr. M. E. Wadsworth, State geologist.

Samples of nickel ore from the Algoma and Sudbury districts, Canada, given, respectively, by R. P. Travers, Commander William H. Fogler, and Prof. W. O. Crosby.

A series of sample lead ores and fluorite from Rosiclare, Ill. Gift of Dr. R. P. Mullin.

A fine sample of folded gneiss. Gift of S. Ward Loper.

Samples of gold and silver ore, and building stone, from near Deadwood, S. Dak. Gift of Mr. Theo. Kuntzen.

One hundred and eleven photographs from the series of negatives in possession of the Geological Society of America, and illustrative of the various geological phenomena. Gift of the U. S. Geological Survey.

A fine large lot of onyx marble from the newly discovered deposit near Prescott, Yavapai County, Ariz. Gift of Mr. William O. O'Neil.

A large series of ores and economic minerals from Texas, Mexico, New Mexico, California, and other States, collected for the Museum by Mr. F. W. Crosby of this city. This collection has not as yet been entered upon the Museum catalogue, but should be mentioned here as it is one of the most important thus far received. Mr. Crosby is especially entitled to our thanks, inasmuch as the collecting is entirely voluntary upon his part, the Museum paying only the bare cost of boxing and transshipment.

ROUTINE WORK.

The character of the routine work has not varied materially from that of previous years. About 1,696 labels have been written, copy of which has been sent to the Public Printer; up to date, 1,385 of these have been returned to us in printed form.

Duplicates have been sent out mainly in the way of exchanges as below:

To Prof. P. Groth, Munich, Bavaria, 3 samples of peridotite and pyroxenite.

To. Prof. William Hobbs, Madison, Wis., 44 specimens miscellaneous eruptive rocks.

To B. Sturtz, Bonn, Prussia, 363 specimens of rocks and ores from miscellaneous American sources.

To Loren B. Merrill, Paris, Me., 12 specimens of rocks and ores.

To L. H. Merrill, Orono, Me., 1 specimen phonolite from the Black Hills, S. Dak.

To Dr. H. H. Johnston-Lavis, Naples, Italy, 66 specimens of eruptive rocks.

To Prof. H. A. Green, Chester, S. C., 14 specimens of rocks and ores.

To Prof. J. A. Udden, Rock Island, Ill., 6 samples of volcanic dusts.

To Dr. E. M. Edwards, Newark, N. J., 17 samples of lake bed deposits and infusorial earths.

To Prof. William North Rice, Middletown, Conn., 4 specimens of eruptive rocks.

To the Columbian University, Washington, D. C., 52 specimens of rocks.

On three occasions collections of rocks have been lent for study, as noted elsewhere.

The work of identifying material sent in by those not connected with the Museum continues, as heretofore, to consume its full share of time. The following list of "special reports" will serve to give some idea of the extent of this practice. As stated previously, the Department can not make analyses or assays on such occasions, but whenever possible without too great an outlay of time the mineralogical nature of the material has been ascertained and the applicant referred elsewhere for information not attainable here. These reports were as follows:

Supposed tin ores; sent by W. D. McComb, San Bernardino, Cal. No. 793.

Rock supposed to be indicative of coal; sent by J. S. Lupton, Winchester, Va. No. 797.

Supposed lava from the "Wakulla Volcano;" sent by A. W. Barber, Tallahassee, Fla. No. 798.

Quartz supposed to contain ore; sent by D. B. Harris, Payson, Ariz. No. 800.

Supposed petrification; sent by P. B. Jacobs. No. 801.

Calcite, gypsum, and conglomerate; sent by S. P. Wright, Elkano, Kans. No. 804.

Galena; sent by S. H. Wright, Longview, Tex. No. 805.

Chloritic mica schist; sent by Hon. F. B. Stockbridge, U. S. Senate. No. 810.

Magnesian limestone; sent by the D. H. Ranck Publishing Company, Indianapolis, Ind. No. 811.

Siliceous rock carrying iron sulphurets; sent by Geo. W. Watkins, Moriah, N. Y. No. 812.

Ochers and clays; sent by J. T. Hamilton, Spokane Falls, Wash. No. 814.

Bog iron ores; sent by Thos Jackson, Plymouth, Mass. No. 815.

Granite; sent by J. W. Baker, Belvedere Hotel, Washington, D.C. No. 824.

Supposed gold ore; sent by F. A. Zeigler, Boyd's Station, Md. No. 828.

Supposed tin ore; sent by N. W. Parrish, Wenatchee, Wash. No. 830.

Supposed tin ore; sent by Emil Wilvert, Sunbury, Pa. No. 835.

Ore for assay; sent by W. A. Fletcher, Rhodelia, Tenn. No. 840.
Material for assay; sent by Jas. Darling, Alpine, Tex. No. 844.
Zinc and lead ore; submitted by S. Fletcher, Phebe, Tenn. No. 845.
Black limestone with pyrite; sent by Emil Wilvert, Sunbury, Pa. No. 846.
Supposed tin ore; sent by Emil Wilvert, Sunbury, Pa. No. 848.
Calcareous sandstone and sulphide of iron; sent by Eugene Beebe, Montgomery, Ala. No. 23470.
Sulphide of copper; sent by J. M. Werth, Stockton, Va. No. 855.
Stone for testing; sent by Montgomery Marble Company, Blacksburgh, Va. No. 860.
Magnetic iron ore; sent by H. G. Hodge, York, Ill. No. 861.
Material for assay; sent by J. R. Dabbs, Chelan, Wash. No. 871.
Kaolin; sent by J. H. Ledy, Marion, Pa. No. 876.
Iron ore; sent by Hon. L. E. McComas, Hagerstown, Md. No. 887.
Clay; sent by E. H. Zipp, Capon Bridge, W. Va. No. 893.
Clay; sent by Geo. Hilton, Coral, S. Dak. No. 899.
Chert nodule; sent by E. C. Bruce, Winchester, Va. No. 902.
Pyrite; sent by G. J. Boruff, Rhodelia, Tenn. No. 905.
Pyrite; sent by S. Fletcher, Phebe, Tenn. No. 906.
Rock; sent by Hon. C. H. Grosvenor, House of Representatives, city. No. 911.
Clay; sent by M. A. Baker, Weston, Oregon. No. 913.
Supposed tin or nickel ore; sent by G. W. Watkins, Moriah, N. Y. No. 916.
Supposed ore; sent by J. C. Chesney, Northumberland, Pa. No. 917.
Material for analysis; sent by Alpine Plaster Co., Los Angeles, Cal. Returned. No. 921.
Fossil-bearing chert; sent by Carter and Rangan, La Fayette, Ga. No. 922.
Rock; sent by Albert Wood, North Bristol, Ohio. No. 924.
Supposed gold and silver ore; sent by J. B. Noyse, Lawrenceburg, Tenn. No. 927.
Limonite; sent by I. E. Welch, Alpine, Ala. No. 928.
A supposed ore; sent by Emil Wilvert, Sunbury, Pa. No. 930.
Siliceous sand colored by iron oxide; sent by J. W. Ragan, Amis, Tenn. No. 23696.
Material for assay; sent by G. W. Hayward, Los Angeles, Cal. Returned. No. 946.
Material for assay; sent by Wright and Henne, Salina, Kans. No. 948.
Aluminous phosphates; sent by John Miner, Brooklyn, N. Y. No. 953.
Samples of marble; sent for opinion, by Judge W. H. Trescott. No. 954.
Material for assay; sent by J. A. Harris, Provo City, Utah. No. 958.
Material for assay; sent by Becker Brothers, Baltimore, Md. No. 960.
Material for assay; sent by C. G. Garrison, Santa Ana, Cal. No. 961.
Supposed nickel ore; sent by G. W. Watkins, Moriah, N. Y. No. 964.
Supposed aluminum ore; sent by P. L. Jouy, Tucson, Ariz. No. 966.
Material for assay; sent by Wm. T. Cessna, Chicago, Ill. No. 968.
Supposed gold ore; sent by E. B. Kennedy, Amicus, Va. No. 969.
Ferruginous clay and travertine; sent by J. C. Chase, Wenatchee, Wash. No. 974.
Material for assay; sent by C. E. G. Burch, Wenatchee, Wash. No. 976.
Supposed onyx marble; sent by J. M. Withrow, La Luz, N. Mex. No. 978.
Chromite; sent by C. H. Campfield, Magdalena, N. Mex. No. 981.
Supposed ore; sent by S. B. Henshow, Stanardsville, Va. No. 984.
Material for assay; sent by John Treweek, Salt Lake City, Utah. No. 986.
Quartz porphyry; sent by Dr. W. Scott Hill, Augusta, Me. No. 987.
Phosphate; sent by the Alexandria Phosphate Co., Alexandria, Va. No. 989.
Material for assay; sent by J. A. Hyde, Nephi, Utah. No. 991.
Supposed petrification; sent by Geo. Coulson, La Hope, Ill. No. 994.
Material for analysis; sent by Ervin Brooks, Crown Point, N. Y. No. 1002.
Iron ores; sent by L. K. Yeatts, Etna, Va. No. 1004.
Graphite; sent by E. R. Threlkeld, Los Angeles, Cal. No. 1007.

Iron pyrite; sent by Miss J. E. Lee, Richmond, Ala. No. 1010.
Iron pyrite; sent by F. C. Fisher, Middleboro, Ky. No. 1011.
Material for assay; sent by D. Kreisher, Johnson City, Tenn. No. 1012.
Supposed ore; sent by T. C. Kennedy, Baltimore, Md. No. 1013.
Siliceous limestone; sent by D. Kreisher, Johnson City, Tenn. No. 1014.
Volcanic dust; sent by R. N. Hess, Arkansas City, Kans. No. 1016.
Material for identification; sent by I. K. Rice, Holly Brook, Va. No. 1017.
Iron pyrite; sent by P. V. Reynolds, Copenhavers Mills, West Va. No. 1021.
Volcanic sand; sent by W. A. Barrington, Toole City, Utah. No. 1024.
Calc tufas; sent by J. Marjenhoff, Charleston, S. C. No. 1029.
Materials for analysis; sent by H. C. Allen, Buckley, Wash. No. 1031.
Rock from Montana; sent by A. C. Murphy. No. 24086.
Material for analysis; sent by Philip Scharf, Tucson, Ariz. No. 1033.
Supposed ore; sent by Henry Warren and Company, Oregon, Tenn. No. 1035.
Material for analysis; sent by Wm. Eppley, Zanesville, Ohio. No. 1040.
Iron pyrites; sent by Alex. Bishop, Teges, Ky. No. 1041.
Fungus; sent by L. K. Yeatts, Etna, Va. No. 1045.
Supposed limestone and marl; sent by Wm. Nelson, Sally, S. C. No. 1054.
Clay; sent by Chas. Metcalf, Las Cruces, N. Mex. No. 1060.
Material for analysis; sent by Christian Nelson, Virginia City, Mont. No. 1062.
Impure limonite; sent by R. Bennett, Eureka Springs, Ark. No. 1065.
Concretionary nodule of pyrite; sent by Edw. Cornell, Pomeroy, Ill. No. 1066.
Mineral for determination; sent by J. W. Ragan, Hawkins County, Tenn. No. 1069.
Eruptive (?) rock carrying epidote; sent by G. N. Trusell, Shepardstown, W. Va. No. 1070.
Supposed fossil; sent by Frank Meddock, Mainsville, Ohio. No. 1071.
Clay; sent by C. R. Richey, Abbeyville, S. C. No. 1079.
Material for assay; sent by J. H. Heyens, Ogden, Utah. No. 1084.
Clay ironstone concretion; sent by C. C. Tread, Des Moines, Iowa. No. 1086.
Lead ore; sent by J. C. Connor, Powells Station, Tenn. No. 1093.
Quartzite; sent by J. W. Ragan, Rogersville, Tenn. No. 1094.
Clay; sent by J. C. Taylor, Springer, N. Mex. No. 1095.
Supposed ore; sent by L. K. Yeatts, Galveston, Va. No. 1097.
Ferruginous clay; sent by H. A. Green, Chesney, S. C. No. 1098.
Ores for determination; sent by Hon. Chas. T. O'Ferrall, Harrisonburg, Va. No. 1101.
Hematite; sent by J. W. Hilton, Ackworth, Ga. No. 1104.
Chert with iron sulphides; sent by E. Vawney, Goshen, Ark. No. 1106.
Limonite; sent by W. J. Anderson, Hartmansville, W. Va. No. 1107.
Ores for assay; sent by Antonio Cunha, Big Pine, Cal. No. 1108.
Supposed aluminum ore; sent by S. P. Roberts, Big Pine, Cal. No. 1112.
Hematite; sent by W. R. Bond, Custer, S. Dak. No. 1123.
Fire clay; sent by H. D. Fuller, Winchester, W. Va. No. 1124.
Gypsum and supposed tin ore; sent by F. Griffith, Glendive, Mont. No. 1125.
Supposed fossil; sent by W. Lane, Wild Rose, Wis. No. 1126.
Ores; sent by Henry Clause, Phebe, Tenn. No. 1127.
Manganese ore; sent by O. H. Swingle, Dudleyville, Ariz. No. 1130.
Limonite; sent by L. P. Halley, Biloxi, Miss. No. 1131.
Infusorial earth; sent by D. G. Martin, Eagle Rock, Idaho. No. 1133.
Material for assay; sent by S. Heymann, Fayetteville, Tenn. No. 1150.
Rocks for identification; sent by M. L. Marvin, Goodrich, Mich. No. 1157.
Supposed aluminum ore; sent by S. P. Roberts, Big Pine, Cal. No. 1158.
Impure infusorial earths; sent by M. M. Faught, Idaho Falls, Idaho. No. 1160.
Material for identification; sent by J. H. Claitonie, Walls Springs, Tenn. No. 1166.
Pumiceous sand; sent by J. H. Robinson, Lewiston, Idaho. No. 1170.
Ores for identification; sent by W. A. Fletcher, Rhodelia, Tenn. No. 1172.

Supposed kaolin; sent by E. Watrous, Weiser, Idaho. No. 1173.
Ores for identification; sent by Henry Clause, Phebe, Tenn. No. 1179.
Graphite; sent by J. D. Schneider, Allentown, Pa. No. 1180.
Material for determination; sent by Marion Moyers, Compensation, Tenn. No. 1186.
Supposed phosphate; sent by F. M. Westerfelt, Rural, Fla. No. 1201.
Ores for determination; sent by I. Bradon, Phebe, Tenn. No. 1203.
Material for assay; sent by W. R. Findly, Hoodsport, Wash. No. 1211.
Supposed fossil; sent by W. S. Danforth, Boulder, Colo. No. 1220.
Material for assay; sent by L. Ballard, Lindside, W. Va. No. 1221.
Ores for determination; sent by O. P. Sybest, Ravenwood, W. Va. No. 1225.
Supposed tin ore; sent by Emil Wilvert, Sunbury, Pa. No. 1236.

It will be seen from the above that out of a total of 452 accessions coming to the entire Museum for examination, this department alone received 132, or nearly 30 per cent. The curator is often called upon to give information regarding material brought to the Museum for identification.

A new case has been built across the east end of the west south range and which affords accommodations for the collections of rocks forming minerals, structural, color, and specific gravity series, as well as the larger collections in historical geology.

The work of installing the exhibition series is always more or less experimental, and the curator is, or should be, continually striving to introduce methods whereby the most pleasing effects are produced, as well as each object brought into such position as shall render its points of interest most readily seen. Thus a considerable amount of time is consumed in what may be called experimental work. In those cases where economy of space demands two or more rows of specimens on each shelf, it is often a matter of some difficulty to so place the objects in the back row that they can be readily seen. The prevailing method has been to simply raise these specimens a little above those in the front row by means of blocks of wood. This, however, proved scarcely sufficient in the case of the ore and petrographic collections, and therefore a bent wire bracket was devised, which, by means of a small wire staple, is readily attached to the wooden block, and which then holds the specimens standing, inclined at an angle of 60 to 80 degrees, as shown in the accompanying diagram. The specimens on the front rows being laid flat, both series are thus rendered equally conspicuous.

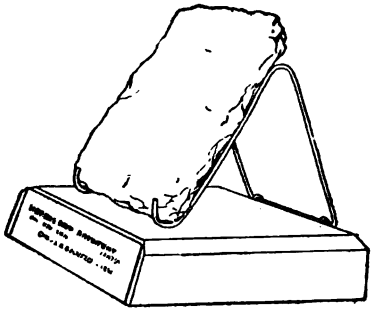


DIAGRAM 2.—Bent-wire holder and block for exhibiting specimens of rocks.

The cost of these wires in Washington is but from 1 to 2 cents each, and they have been found of the greatest utility.

In the wall cases occupied by the geographic series of economic materials, it has been found advisable to largely do away with the loose blocks and substitute in place of them narrow shelves of an equal thickness, but raised by brackets a few inches above the lower, wider shelf. This allows a little variation in the size of specimens on the lower shelf, and permits the placing of the label directly against the edge of the narrow shelf itself, where it is not obscured by the specimen in front and can be readily seen.

How to so mark a specimen that its identity can under no ordinary circumstances become destroyed has ever been a source of trouble to those engaged in museum work. After considerable experimenting, the method of procedure given below has been adopted.

As soon as the specimen is catalogued, a blue rectangular stripe of sufficient dimensions for receiving the number is painted upon it in oil colors, the material used being dry ultramarine blue mixed with white lead and sufficient hard oil finish to thin it for applying with a brush. This dries quickly, giving a firm, glossy surface, upon which the catalogue number is then painted in white, Windsor and Newton's flake-white tube paint, thinned with turpentine, having been found best adapted for this purpose. This gives a practically indestructible number, sufficiently conspicuous to be readily found on specimens of any color or texture, and which at the same time does not, if neatly applied, in the least mar their appearance. This method is of course applicable only to substances of considerable firmness of texture. Pulverulent or liquid materials must be marked upon the box, bottle, or tray in which they are exhibited.

I may say, further, that the use of the maroon color for background and shelves has, so far as the curator is concerned, been condemned and the practice discontinued. This for the double reason that the color is too dark and gives rise to too much reflection from the glass doors of the cases, and that it is too easily soiled. The color found to be most serviceable and generally satisfactory is light, with a faint tinge of yellow or cream, the specimens themselves being placed on blocks painted a dull, lusterless black.

Owing to the pressure of routine work no time has been given to research with a view to immediate publication. The titles of such papers as have so far appeared are given in the bibliography (section IV). As will be observed, this includes, with two exceptions, merely matter furnished to one of the industrial journals.

The collections have been frequently consulted by others not officially connected with the Museum, and in three instances material have been lent for study.

In this way a portion of the collections of the Fortieth Parallel Survey were lent to Mr. C. R. Van Hise, a small series of Arkansas syenites to the Geological Survey of that State, and some fifty specimens of Mesozoic eruptives to Prof. H. D. Campbell, of the Washington and

Lee University, Virginia. All of these except the last named have been returned. Mr. L. J. Boettcher has for some weeks occupied a table in this office and has had free access to the collection of thin sections for purpose of study.

The present state of the collection is sufficiently set forth in the preliminary handbook already referred to. The numbers given below are substantially the same as therein given:

A. Systematic geology:	
(1) Exhibition series	4,800
(2) Study series	12,000
B. Economic geology:	
(1) Exhibition series	10,600
(2) Study series	4,000
Total	31,400

The apparent discrepancy between this and the statements given in previous reports is due to the fact that much of the foreign material there mentioned as forming a portion of the exhibition series is being gradually overhauled and much of it condemned or sent to storage. Matters are, therefore, still in a transition stage.

No attempt is made at estimating the amount of duplicate material, nor that included in some three hundred boxes still lying in storage and concerning the contents of which the present curator has little accurate knowledge.

The exact disposition of their contents is a matter yet to be decided upon. In fact, the figures are intended to include only such material as has been finally administered upon and assigned to some definite position in the collections. It should be stated, further, that indiscriminate collecting has been discouraged, and the tendency has been constantly in the line of condensation.

As with other departments of the Museum, there is great need of additional exhibition space. Aside from the erection of a new building, I can see but one method by which this space may be secured. This consists of building a narrow balcony around the southwest court, and just above the present wall cases. This will allow the utilization of the spaces between the piers for cases, and will be sufficient to accommodate the entire building-stone collection now comprised in the fourteen screen cases of the west south range. There will therefore be gained for the geological exhibit a floor space some 25 by 60 feet, besides the advantage of having the entire economic series by itself in the court.

The general arrangement of cases and their contents in the west south range may be best understood by reference to the accompanying diagram. The smaller objects mounted on special bases are not here indicated, inasmuch as they are subject to change at any time.

The regular working force of the department, aside from the curator, has been as follows: For the entire year, Mr. W. H. Newhall; since October 30, Miss C. Hurlbut, and since March 6, Mr. G. C. Neale.

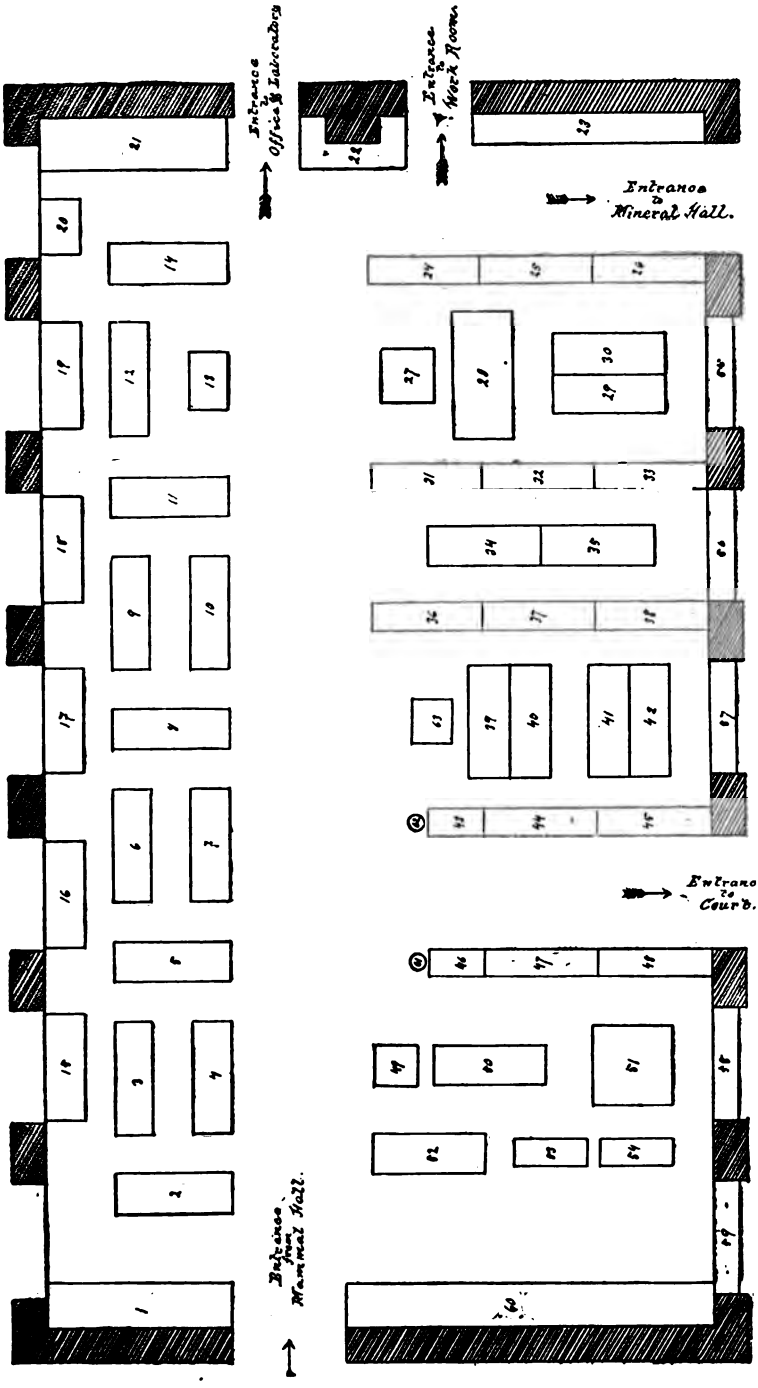


DIAGRAM 3.—Plan showing arrangement of cases in West South Range, 1890-'91.

THE GENESIS OF THE NATIONAL MUSEUM.

By G. BROWN GOODE,
Assistant Secretary Smithsonian Institution, in charge of U. S. National Museum.

When, in 1826, James Smithson bequeathed his estate to the United States of America "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men," he placed at the disposal of our nation two valuable collections, one of books and one of minerals.

In the schedule of Smithson's personal effects, as brought to America in 1838, occurs the following entry:

Two large boxes, filled with specimens of minerals and manuscript treatises, apparently in the testator's handwriting, on various philosophical subjects, particularly chemistry and mineralogy; eight cases and one trunk filled with the like.

This collection and the books and pamphlets mentioned in the same schedule formed the beginnings, respectively, of the Smithsonian library and the Smithsonian museum. The minerals constituted, so far as the writer has been able to learn, the first scientific cabinet owned by the Government of the United States. Their destruction in the Smithsonian fire of 1865 was a serious loss. Our only knowledge of their character is derived from the report of a committee of the National Institution, who in 1841 reported upon it as follows:*

Among the effects of the late Mr. Smithson is a cabinet which, so far as it has been examined, proves to consist of a choice and beautiful collection of minerals, comprising probably eight or ten thousand specimens. The specimens, though generally small, are extremely perfect, and constitute a very complete geological and mineralogical series, embracing the finest varieties of crystallization, rendered more valuable by accompanying figures and descriptions by Mr. Smithson, and in his own writing. The cabinet also contains a valuable suite of meteoric stones, which appear to be suites of most of the important meteorites which have fallen in Europe during several centuries.

* Proceedings of the National Institution, July, 1841, II, p. 95. Francis Markoe, jr., Secretary of the National Institute, in a letter written to the American Philosophical Society in 1841, described as a part of this cabinet "a superb and very large collection of precious stones and exquisite crystallized minerals * * * decidedly the richest and rarest collection in the country."

For a catalogue in general terms see Alfred Hunter's "Popular Catalogue of the Extraordinary Curiosities in the National Institute, etc.," published in 1855, and William J. Rhees's "Account of the Smithsonian Institution, etc.," 1859.

This report was made in July, 1841, at the time when, by order of the Secretary of the United States Treasury, the minerals, books, manuscripts, and other articles forming part of the Smithson bequest, were deposited in the custody of the National Institution, where they remained until 1858.

A room had been planned for their reception in the Smithsonian edifice, which was to be made fireproof,* but if this was ever constructed it was not occupied, and the collections having been displayed for some years in the Regents' room, were destroyed by fire January 24, 1865.

The National Institution was for nearly eighteen years the official custodian of these and other museum materials belonging to the nation. This organization, ten years before the Smithsonian Institution was prepared to receive any collections whatever, fourteen years before its buildings were ready for the exhibition of museum objects, and in after years, until its charter expired by limitation in 1862, held many objects whose proper place was in the National Museum. Indeed, the retention of many historical objects in the Patent Office hall until 1883, was an evidence of a lingering uncertainty as to the proper location of responsibility for the care of the national collections.

In order to understand the genesis of the National Museum of the United States it seems necessary to examine the history of this society, at one time so enterprising and influential.

The National Institution for the Promotion of Science, organized in Washington May 15, 1840, was for some years the most prominent exponent of the idea of a national museum.† The establishment of this society was doubtless to a very great degree due to the stimulating and inspiring effects upon public opinion of the Smithson bequest. The germs of the idea which it represented seem, however, to have been existing in Washington at a much earlier period, for in 1816, or before, a similar society had been organized in the capital under the name of The Columbian Institute for the Promotion of Arts and Sciences.‡

The Columbian Institute received on May 20, 1818, a charter from Congress which expired in 1838, after which its members "were invited to become members of the National Institution, and to deposit in its cabinet their effects, books, and papers." §

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*Report of the building committee to December 1, 1847, in Report of the Board of Regents, January 6, 1848, Thirtieth Congress, first session, Mis. Doc. 23, p. 8.

† The National Institution was organized at the seat of government on the 15th of May, 1840, by the adoption of a constitution and the declaration of the objects of the institution, which are to promote science and the useful arts, aiding to establish a national museum of natural history, etc." Bulletin of the Proceedings of the National Institute, 1840, I, p. 3 (introduction).

‡ Before 1816 an organization known as "The Metropolitan Society" was in existence in Washington, and the Columbian Institute was an outgrowth of it or replaced it. The United States Military Philosophical Society met in Washington and New York as early as 1805.

§ Proceedings of the National Institution, July 12, 1841, Vol. I, p. 94.

This invitation was accepted July 17, 1841,* in a letter from Asbury Dickins, secretary, and although no record of any transfer is to be found in the Bulletin of the National Institution, I have before me a letter from Messrs. John J. Abert, A. O. Dayton, and F. A. Markoe, committee of that society, addressed to the Secretaries of the War and Navy Departments, January 1, 1842, in which, among the other collections in their custody, they mention "the books, minerals, and works of art belonging to the late Columbian Institute," and also the "books, papers, and proceedings of the late American Historical Society," an organization to which also the National Institution stood in the position of an heir.

To Dr. Edward Cutbush is due the preservation of the only statement extant of the objects of the Columbian Institute, embodied apparently in its constitution, and quoted as follows in his address as its president, delivered January 11, 1817, in Congress Hall, Washington.†

To collect, cultivate, and distribute the various vegetable productions of this and other countries, whether medicinal or esculent, or for the promotion of arts and manufactures.

To collect and examine the various mineral productions and natural curiosities of the United States, and to give publicity to every discovery that the institute may have been enabled to make.

To obtain information respecting the mineral waters of the United States, their locality, analysis, and utility, together with such topographical remarks as may aid valetudinarians.

To invite communications on agricultural subjects, on the management of stock, their diseases, and the remedies.

To form a topographical and statistical history of the different districts of the United States, noticing particularly the number and extent of streams, how far navigable, the agricultural products, the imports and exports, the value of lands, the climate, the state of the thermometer and barometer, the diseases which prevail in the different seasons, the state of the arts and manufactures, and any other information which may be deemed of general utility.

To publish annually, or whenever the institution shall have become possessed of a sufficient stock of important information, such communications as may be of public utility, and to give the earliest information in the public papers of all discoveries that may have been made by, or communicated to, the institute.

A remark significant in this connection may be found in a letter witten by Edward Cutbush, M. D., dated Geneva, N. Y., January 20,

* Proceedings of the National Institution, July 12, 1841, Vol. I, p. 113.

† Cutbush, Edward. An address | delivered before the | Columbian Institute, | for the Promotion of Arts and Sciences, | at the City of Washington, | on the 11th January, 1817. | —— | By Edward Cutbush, M. D., | Hon. Member of the Philadelphia Medical and Chemical Societies; | Corresponding Member of the Linnæan Society of Philadelphia; | and President of the Institute. | —— | Published by the request of the Columbian Institute, | —— | Washington. | Printed by Gales & Seaton. | Six parts | 1817. 8vo. pp. 1-29.

A copy of this rare pamphlet is in the library of the Surgeon-General's Office, as well as a nearly complete series of the publications of the two brothers Cutbush.

of the United States, and to render an essential service to the nation by perpetuating an establishment worthy of the metropolis bearing the name of our illustrious Washington, where at some future period the youth of our country will repair to complete their education at the national seminary, to which the Botanical Garden and Mineralogical Cabinet would be important appendages.

Cutbush's address before the Columbian Institute, nearly three-quarters of a century ago, is well worthy of study at the present time.

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knew of the efforts being made to establish a national capital he became anxious to indentify himself with its growth from the very beginning.

He invested all of his property in houses and lots in Washington, and for forty years was one of the most zealous and enlightened citizens.

S. L. Knapp (Ignatius Loyala Robertson, LL.D.) wrote of him in 1830 in his Sketches of Public Characters:

"He purchased largely of the soil, built on an extensive scale, suggested ten thousand plans for the improvement of the city and for the prosperity of the nation; but the slow, doubtful, and often strange course of Congress came not only in his way, but in the way of all those deeply interested in the welfare of the city; and he has spent the days of his maturity and wisdom in unavailing efforts for the improvement of it. It is happy for him, however, that he has lived to see the dawn of a better day for Washington, and, if he cannot stay here long to enjoy it, he will rejoice in the hopes of his friends and descendants."

Among the enterprises in which he participated at an early day was the erection of the great building south of the capitol which has for so many years borne the inscription "Law House."

Three sons, born in India, accompanied Mr. Law to America, one of whom, Mr. John Law, a lawyer in Washington, died before 1824, and all before 1834.

Mr. Law married, as second wife, Miss Custis, daughter of George Washington Parke Custis, the stepson and adopted son of Washington, thus allying himself by family ties with the man whom he so much revered.

Mr. Law was a zealous advocate of a national paper currency and published a book on currency.

He also wrote poetry and contributed to general literature.

He was one of the leaders in the intellectual life of the infant capital, and notwithstanding his personal eccentricities was universally respected. As one of the founders of the first learned society in Washington, he is worthy of our veneration; and since he has been ignored by the biographical dictionaries this notice of his life has been written.

He died in 1834.

Reference to Mr. Law's character and career may be found in an obituary in the National Intelligencer, 1834, quoted in the New England Magazine, September, 1834, in Sketches of Public Characters, by "Ignatius Loyola Robertson" (S. L. Knapp) in the biographical sketch of William Winston Seaton, by his daughter, and in Faux's Memorable Days in America, the review of which in No. 68 of the Quarterly Review evoked Mr. Law's "Reply" which contains much autobiographical matter.

The following are titles of some of Mr. Law's publications, for the verbal accuracy of which no responsibility is taken, since they are usually given second-hand:

1792. LAW, THOMAS. Sketch of some late arrangements and a review of the rising resources of Bengal. London, 1792. 8°. Lib. Cong.

1794. LAW, THOMAS. "On Bengal," etc. Perhaps another ed. of that printed in 1792. Quoted by Allibone.

1806. [LAW, THOMAS.] Ballston Springs. [A poem.] New York, 1806. Boston Ath.

It is full of enlightened patriotism and of hopeful prophecy for the United States and for Washington. "Where genius and talent are respected, rewarded, and promoted," wrote he "the arts and sciences will flourish and the wealth and power of the nation increase."

The wisdom of such men as Cutbush opened the way for the organization of the National Institution, which in its turn, as we shall see, had an important influence toward shaping the course of the Smithsonian Institution.

Indeed the germ of the Smithsonian idea may be found in Cutbush's address—and his spirit was kindred to that of Henry and his associates, who worked under more favorable conditions thirty years later.*

1820. LAW, THOMAS. Remarks on the report of the Secretary of the Treasury, March 1, 1819. Wilmington, 1820. 8°. Boston Ath.

1824. LAW, THOMAS. A reply to certain insinuations, published as an article in the sixty-eighth number of the Quarterly Review. Washington, 1827. 8°. pp. 1–27. (1.) Lib. Cong. Refers to a libelous article; a review of Faux's Memorable Days in America.

1827. LAW, THOMAS (and others). Report of the proceedings of the committee appointed in Washington in 1824 to present a memorial to Congress, praying for the establishment of a national currency. Washington: Way & Gideon. 1824. 8°. 40 pp. Lib. Cong.; Boston Ath.

1825. LAW, THOMAS. Address before the Columbian Institute. Washington, 1825. 8°. Boston Ath.

1826. LAW, THOMAS. Considerations tending to render the policy questionable of plans for liquidating, within the next four years, of the 6 per cent stocks of the United States. Washington: S. A. Elliott. 1826.. 8°. pp. 22. Lib. Cong.; Boston Ath.

1827. LAW, THOMAS. Propositions for creating means for commencing the Chesapeake and Ohio Canal, with report of committee thereon. [Washington, 1827?] 1 folio sheet. Lib. Cong.

1828. LAW, THOMAS. Address to the Columbian Institute on a moneyed system. Washington, 1828. 8°. Lib. Cong.; Boston Ath.

1830. LAW, THOMAS. Address to the Columbian Institute on the question, "What ought to be the circulating medium of a nation?" Washington, 1830. 8°. Lib. Cong.; Boston Ath.

1833. LAW, THOMAS. Synopsis of a plan for a national currency. Washington, 1833 8°. Lib. Cong.

* The two brothers James and Edward Cutbush were among the most active of the popular teachers and promoters of science and education at the beginning of the present century, and it would be unjust to allow their names to drop out of the history of American science.

Both were physicians, both teachers of chemistry, both enthusiastic in the work of founding schools and learned societies. They were born, certainly in Pennsylvania, probably Philadelphia, somewhere between the years 1750 and 1770. Edward entered the medical department of the University of Pennsylvania in 1790 and graduated in 1794, and his brother James at about the same time or a little later. James Cutbush at the beginning of the century, and for a few years subsequent, was engaged in delivering courses of chemical lectures in Philadelphia, presumably for the benefit of medical students.

He appears to have enlisted as a volunteer in a Pennsylvania regiment at the beginning of the war of 1812, and at its close, on the 12th of August, 1814, was appointed Assistant Apothecary General in the regular army of the United States,

The National Institution began its career at a time when the country was chafing under the irritation of the delays of Congress in organizing the institution of learning provided by Smithson, whose legacy had for some years been deposited in the Treasury.*

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which position he held until 1820, when he was appointed post surgeon and chief medical officer of the Military Academy at West Point. In November, 1821, he was made assistant surgeon and acting professor of chemistry and mineralogy in the academy, in which capacity he served until his death, which occurred on December 15, 1823.

His most important work, A System of Pyrotechny (8vo, Philadelphia. 1825, i-xliv, 1-612), was published in Philadelphia after his death by his widow, aided by a subscription from the cadets of the Military Academy.

Another work, entitled "The Philosophy of Experimental Chemistry," in two volumes (Philadelphia, 1813, 12mo, (1) pp-xii, 1-356 (2) i-viii, 1-339) appears to have been the earliest general work or text book on chemistry written in America, although Benjamin Rush had printed a syllabus of his lectures which gave him the title to be considered "the father of chemistry in America," and James Cutbush himself had, as early as 1807 or 1808, prepared an Epitome of Chemistry, for the use of St. John's College, in which he was a teacher, of the publication of which, however, I have found no record.

In 1812 he delivered an "Oration on Education" (Philadelphia, 1812, 8vo, pp. 1-50), before the Society for the Promotion of a Rational System of Education, of which he was vice-president—an enlightened and eloquent address full of historical information. He also published in 1808 a book called "The Useful Cabinet," a treatise "On Hydrostatics and Specific Gravity," and also certain papers in the American Journal of Science.

Besides holding a corresponding membership in the Columbian Institute at Washington, which was founded by his brother, he was president of the Columbian Chemical Society and member of the Linnæan and Agricultural Societies of Philadelphia. Rafinesque, enumerating in 1817 those of the American scientific men whom he considered entitled to rank as philosophers, mentions the name of Cutbush along with his own and those of Jefferson, Clinton, Vaughan, Bentley, Winthrop, Patterson, Williamson, Griscom, Wood, Dupont, Woodward, Rush, Mitchell, Ramsay, and Priestly.

Edward Cutbush, after his graduation at the Philadelphia Medical School in 1794, became attached to the militia of Pennsylvania, first as hospital surgeon and subsequently as surgeon-general. On the 24th of June, 1799, he was appointed a surgeon in the U. S. Navy, in which capacity he served until June 20, 1829, when he resigned. In the years 1816 and 1817 he appears to have been stationed in Washington, and at this time participated in the foundation of the Columbian Institute for the Promotion of Science. I can find no record of his whereabouts after 1829 until 1835, when he was a resident of Geneva, N. Y., and participated in the establishment of the medical institute of Geneva College, in which he became professor of chemistry. On the occasion of its formal opening, on February 10, 1835, he delivered a discourse "On the history and methods of medical instruction" (Geneva, 1835, 8vo, pp. 1-24). In 1842 he appears to have been still at Geneva, and at this time was probably a man seventy or eighty years of age. His Washington address and his Geneva address appear to be his only literary remains, with the exception of a book which was published in Philadelphia in 1808 entitled "Observations on the Means of Preserving the Health of Soldiers and Sailors," etc. (Philadelphia, 1808, 8vo, pp. i-xvi, 1-316, 1-14).

* Smithson had died in 1829, but the legacy did not become available until after the death of his nephew, the residuary legatee, in 1835, after which, in August or September of that year, the Government of the United States was first apprised of

It has already been suggested that the National Institution owed its origin to the influence of the Smithson bequest. Indeed it may not be altogether impossible that it was founded with special reference to some plan looking toward securing the control of this bequest.

Although less than fifty years have gone by, I can not learn that any of those who were active members at the time of its organization are still living, and unfortunately no one seems to have left any written record of the secret history of this very significant movement.

It seems possible, however, to read between the lines, in the official publications of the society, and the utterances of its friends, and thereby to acquire a certain additional insight into their meaning.

With this in mind, it is instructive to review briefly the history of the discussions which preceded the final organization of the Smithsonian Institution—not with reference to its entire policy, for this has already been well done by others, but in connection with its relations to the national institution, and the custodianship of the National Museum.

In 1835, as we have seen, the fact was first made known that Smithson, who had died in Genoa, six years earlier, had bequeathed the reversion of his whole estate to the United States of America "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."

The bequest was communicated to Congress by the President on the 17th of December, and was accepted by Congress by an act approved July 1, 1836, pledging "the faith of the United States" to the due application of the fund to the purposes of the bequest.

On the first of September, 1838, the proceeds of the estate, amounting to $508,318.46, was paid into the United States mint, and shortly after the convening of Congress in that year, in a message dated December 6, President Van Buren informed both Houses that the amount received having been invested, he deemed it proper to invite the attention of Congress to the obligation devolving upon the United States to fulfill the object of the bequest.

Eight sessions of Congress passed by before any definite plan of organization was decided upon, and suggestions from all parts of the country were liberally forthcoming. Strange to say nearly every suggestion, no matter how humble its source, seems to have had its weight in the deliberations, and almost every one was embodied in one or more of the provisions of the numerous bills brought up for the consideration of Congress.

In 1836, when this matter first came to the notice of the Senate, it seems to have been the generally accepted opinion of those who took

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the fact of the existence of such a bequest. The legacy was brought to New York in August, 1838, but no definite action was taken concerning its application until eight years later, when on August 10, 1846, the act of Congress establishing the Smithsonian Institution was passed. The Regents held their first meeting September 7, 1846, and elected a secretary, who accepted the trust on December 14, and entered upon his duties a week later.

part in the discussion that the intention of the testator was the establishing of a university.

In this direction, too, was the tendency of the advice of those "persons versed in science and in matters relating to public education," to whom in July, 1838, the Secretary of State addressed letters, asking advice as to the most advantageous mode of applying the proceeds of the bequest.*

Of these, three favored a school of high grade. President Wayland, an institution which should occupy "the space between the close of a collegiate education and a professional school; Dr. Cooper, "an institution of the character of a university;" President Chapin, "an institution for liberal and professional purposes and for the promotion of original investigations—to carry through a range of studies much above those of the ordinary collegiate course."

Horatio Hubbell, of Philadelphia, also in a letter to President Van Buren urged a university on the German plan, with numerous professorships, chiefly scientific, and Prof. Dungleson, of the University of Virginia, in two very favorable letters in the "Southern Literary Messenger" (under the signature "*Δ*," Vol. v, 1838, p. 828, Vol. vi, 1840, p. 25), proposed the foundation of "a central school of natural science," to be supplemented in time by a botanical garden, an observatory, a zoölogical institute, or analogous means (including, doubtless, in his mind, museum collections), for prosecuting in a proper way the great sciences of astronomy and general physiology—"a school where natural philosophy, chemistry, geology, mineralogy, philosophy, and all other sciences could effectually be taught—a school which, so far from clashing with others, would aid them—which, although it might be helped by a gift of funds from the nation, could nevertheless go into operation without them—which under a wise management could be speedily brought to yield results of the utmost practical importance, and fulfill to the very letter the wishes of the testator."†

Mr. Rush objected to a school of any kind, and proposed a plan which more nearly than any other of the early ones corresponded with that which was finally adopted. In a shadowy way he outlined a system of scientific correspondence, of lectureships, of general coöperation with the scientific efforts of the Government, of a liberal system of publication, and even of collections of geological, zoölogical, botanical, ethnological, and economical objects.

The fifth response was from the venerable Senator and ex-President, John Quincy Adams, who, from 1835, when he was appointed chairman

*These are the names of the persons thus addressed:

The Hon. John Quincy Adams, Senator and ex-President; Thomas Cooper, M. D., Columbia, S. C.; Hon. Richard Rush, Sydenham, near Philadelphia, Pa.; Prof. Francis Wayland, President of Brown University, Providence, R. I.; Hon. Albert Gallatin, Rev. Stephen Olin, Phelan Lindsley, and others.

† Southern Literary Messenger, *l. c.*, and also Rhees, "Documents," etc., pp. 864–890.

of the select committee of the House, to report upon the Smithson bequest, appears to have taken a deep interest in its fate, and to have felt personally responsible for its judicious administration. In his letters to the Secretary of State, October 8 and 11, 1838, he brought forward with great vigor the proposal that the first use to be made of the fund was the establishment of a great national astronomical observatory, and in January, 1839, as chairman of the House committee, acting jointly with a similar committee from the Senate, he reported a bill (House bill 1161, Senate bill 293) providing for the establishment of an observatory fully equipped, with provision for the publication of its observations, and the annual composition and publication of a nautical almanac.

This bill, which was evidently a minority report of the joint committee, was reinforced by two sets of resolutions, proposed by Mr. Adams in the House, one reported from the committee, January 26, providing—

That the first appropriation from the interest or income of the Smithsonian fund ought to be for the erection and establishment, at the city of Washington, of an astronomical observatory, provided with the best and most approved instruments and books, for the continuing observations, calculation and recording of the remarkable phenomena of the heavens, for the periodical publication of the observations thus made, and of a nautical almanac for the use of the mariners of the United States and of all other navigating nations.

The second, reported February 6, recited the opinion—

That the education of the children of these United States is a duty of solemn and indispensable obligation incumbent upon their parents and guardians, not for the increase and diffusion of knowledge among men, but to qualify them for the enjoyment of their rights, and the performance of their duties throughout life (and therefore), that no part of the Smithsonian fund ought to be applied to the education of the children or youths of the United States, nor to any school, college, university, or institute of education.

The latter resolutions were evidently intended as a counterpoise to the view still held by many members of the Senate, which was brought forward by the speech of Senator Asher Robbins, of Rhode Island, January 10, 1839, in which he urged "that this institution should make one of a number of colleges, to constitute a university, to be established here, and to be endowed in a manner worthy of this great nation and thus increase resources."

On the 18th of February Senator Robbins produced an antidote to Mr. Adams's anti-university resolution in the following:

1. *Resolved*, That it is the duty of the United States, they having accepted the trust under the will of Mr. Smithson, of London, to execute that trust bona fide according to the true intent and meaning of the testator.

2. *Resolved*, That the trust being to found an institution in the city of Washington for the increase and diffusion of knowledge among men, the kind of institution which will have the effect intended and described, in the most eminent degree, will be the kind of institution which ought

in good faith to be adopted as being most in accordance with the true intent and meaning of the testator.

3. *Resolved*, That all experience having shown scientific and literary institutions to be by far the most effectual means to the end of increasing and diffusing knowledge among men, the Smithsonian Institution should be a scientific and literary institution, formed upon a model the best calculated to make those means the most effectual to that end.

4. *Resolved*, That to apply said trust fund to the erection and support of an observatory would not be to fulfill bona fide the intention of the testator, nor would it comport with the dignity of the United States to owe such an establishment to foreign eleemosynary means.

Neither of the bills was received with favor, and the Twenty-fifth Congress came to an end without any decision having been reached. Senator Robbins retired from public life at this time, and the university idea was not subsequently brought promptly forward. During this session, however, various petitions were received. One was from Prof. Walter R. Johnson, urging the foundation, advocating the claims of "an institution for researches in practical science."*

Another was from Charles Lewis Fleischmann, of the United States Patent Office, proposing the establishment of an institution for the promotion of agriculture, with experimental farms of 1360 acres, manufactories, mills and workshops, a considerable staff of teachers and instructors, and one hundred students at the commencement.†

The Kentucky State Agricultural Society petitioned for the endowment of an agricultural school or college out of the legacy, and the Superintendent of the Coast Survey, Mr. Hassler, was urging the foundation of an astronomical school.

In the meantime public interest was becoming awakened. The matter was agitated in the newspapers and reviews, petitions were coming in from individuals, urging speedy action, and the corporation of the city of Washington, through their mayor, Peter Force, presented a vigorously worded memorial to Congress.‡

Early in the first session of the Twenty-sixth Congress, 1839–'41, Mr. Adams again brought up the Smithson bequest, introducing again his bill for the establishment of a national observatory and reënforcing it by his famous report of 1840§ and a speech of considerable length, supplemented by an elaborate statement from the astronomer royal of Great Britain concerning the observatories at Greenwich and elsewhere.

Mr. Adams seems to have been alone in his advocacy of the observatory and his bill and report produced no results.

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* Presented to the House of Representatives May 21, 1838.—See Rhees. Documents, pp. 171–186.

† Reported to the House of Representatives January 9, 1839.—See Rhees's Documents, etc., pp. 186–198.

‡ Rhees's Documents, etc., pp, 200, 201.

§ First session, House of Representatives Report No. 277. Smithson bequest. (To accompany amendatory bill H. R. No. 1). May 5, 1840. Washington: Blair & Ross, printers. 8vo., pp. 155.

It was just at this time that the National Institution was organized on the 15th of May, 1840, by the adoption of a constitution and a declaration of its objects, "which are to promote science and the useful arts and to establish a national museum of natural history, etc."

The constitution of this society in its first form was somewhat meager, but as printed on the cover of the second bulletin of proceedings is decidedly prophetic of the future act of incorporation of the Smithsonian Institution.

Its plan, however, was conceived in a broad and liberal spirit, its membership was a strong one, including at the beginning about ninety representative men of Washington, members of Congress, scientific men, clergymen, and prominent citizens, and as many more corresponding members, among whom were all the leading men of the country. Among its principal officers were the Secretary of War, the Secretary of the Navy, ex-President Adams, the Chief of Engineers of the Army, and other prominent officials. The meetings were well attended, the membership was enthusiastic, gifts of books and specimens began to flow in, and the prospects of the society looked very bright.

In his discourse* on the objects and importance of the National Institution, delivered January 5, 1841, its president, Mr. Poinsett, referred pointedly to the Smithson bequest, saying that it offered a favorable occasion for carrying into effect all the important objects connected with a national institution, such as that just being organized in Washington, enabling the Government to afford all necessary protection to the promotion of science and the useful arts† without the exercise of any doubtful power, etc.

Soon after this, in February, Senators Linn and Preston, both members of the National Institution, proposed new bills for the organization of the Smithsonian Institution, at the same time reporting a bill to incorporate the National Institution for the Promotion of Science.

By these bills the entire management of the Smithsonian fund was to be intrusted to the National Institution. Its officers, a superintendent, and six professors were to be nominated by that society, which was also to prescribe their duties. Provision was made for joint occupancy by the two institutions of buildings to be erected at the cost of the Smithson bequest, and finally it was required—

That all collections of works of art and of natural history owned by the United States, not otherwise assigned (or "all works of art, and all books relating thereto, and all collections and curiosities belonging to the United States in the possession of any of the Executive Departments and not necessarily connected with the duties thereof") shall be deposited in said buildings (or "shall be transferred to said institution, to be there preserved and arranged").

In these bills, drawn up in 1840, may be found the germ of the National Museum idea, even to the extent of a proposition for an appro-

* Discourse, p. 49.

† The avowed objects of the National Institution.

priation from the National Treasury, to be expended under the direction of the officers of the National Institution, the president and directors of which were the prototypes of the Smithsonian Chancelor and Regents for purposes connected with the administration of the collections such as it was not deemed proper to pay for out of the Smithsonian fund.*

The object of the National Institution was *the promotion of science and the useful arts*, but the principal agency chosen for accomplishing this object was *a national museum of natural history*, etc.

This was stated clearly in its declaration of objects at the time of its organization in 1840, as well as in its constitution.†

The sections relating to the Museum in the proposed act of incorporation of the Institution of 1841 corresponded precisely to Articles XIV and XVI of the constitution of the society, except that the provision for the appointment of curators by the Institution is omitted.

It was evidently the intention that the Board of Managers should control the national collections by virtue of the authority vested in them in their proposed control of the Smithsonian Institution.

The act to incorporate the National Institution did not receive the approval of Congress until 1842,‡ when new proposals for the organization of the Smithsonian Institution were brought forward, very similar in many respects to those which had developed within the National Institution.

The idea of a national museum to be administered in connection with

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* And for the transportation and arrangement of the same, the sum of $5,000 is hereby appropriated out of the Treasury of the United States, to be expended under the direction of the president and directors of the National Institution. (Senate Bill, No. 245, Twenty-sixth Congress, 1839–41., Section No. 4.

† Constitution, May, 1840, January, 1841:

ARTICLE XIV. The resident and corresponding members shall exert themselves to procure specimens of natural history, etc., and the said specimens shall be placed in the cabinet, under the superintendence of a board of curators to be appointed by the directors. All such specimens, etc., unless deposited specially, shall remain in the cabinet, and in case of the dissolution of the Institution, shall become the property of the United States.

Constitution, February, 1842:

ARTICLE XIV. The Institution shall have power to appoint curators and others for the preservation and arrangement of its collections. The resident and corresponding members shall exert themselves to procure specimens of natural history, etc., and the said specimens shall be placed in the cabinet under the superintendence of a curator or curators. All such specimens, etc., unless deposited specially, shall remain in the cabinet, and in case of a dissolution of the Institution, shall become the property of the United States.

ARTICLE XVI. The various collections of the Institution shall be placed in the apartments which may be designated for that purpose by a majority of the directors.

‡ Senator Preston, April 11, 1842, reintroduced his bill of the previous year.

the Smithsonian organization had been suggested by no one in the five years of discussion which preceded the organization of the National Institution.

It is true that there had been plans proposed, especially those of Dunglison and Rush, which might have led up to the development of a museum, but the value of the museum as an educational agency and as an aid to research was not understood in those days. In its former aspect, it needed the teachings of the great exhibitions from 1851 to 1876, in the latter the vivifying influence of the Darwinian scientific renaissance of 1859.

The subject of the Smithsonian legacy and its proper disposition was henceforth one of those most frequently discussed by the founders of the National Institution, and for years it was the opinion of many influential men that this society should be made the custodian of the Smithson fund, and that the interests of the two establishments should be united.

A suggestive indication of the sentiment of the officers of the Institution is found in the letter of the committee of management to the Secretaries of War and the Navy in 1842, in which they remark that the object of the National Institution is "*to increase and to diffuse knowledge among men*"—making prominent the words of the Smithsonian bequest instead of the official definition of the objects of their own society, and deliberately indicating the fact of quotation, by the customary symbols.

The influence of this society was strongly and continuously present in Congress, for the six years which followed its organization, until the Smithsonian act was finally bound, and it seems very appropriate to try to ascertain whose was the master mind which not only prevailed in finally ingrafting the development of the National Museum upon the Smithsonian project, but which directly or indirectly led to the formation of the various features of organization which have become such characteristic elements in the Smithsonian plan.

The controlling mind was evidently that of Joel R. Poinsett, of South Carolina, who was Secretary of the Navy in 1840, and at whose house the society was organized, by eight persons, among whom were, of course, Mr. Poinsett, Col. Abert, Mr. Markoe, and Col. Totten. Mr. Poinsett was senior director, under the first plan of organization, and occupied the chair at every meeting until, under the amended constitution, he was elected its first president in 1841. The amendment to the constitution was doubtless made in order to retain his official leadership, for he became director *ex officio* while Secretary of the Navy. With the close of Van Buren's administration he became a private citizen, but the constitution was amended before his retirement from the Cabinet, and the position of presiding officer was never proffered to his successor.

Although from this time on absent from the city, he was retained in the presidency and reëlected in 1841, the vice-president of the society, Col. Peter Force, continually presiding in his absence.

Although the society elected its officers annually, Mr. Poinsett told Mr. Adams soon after his election that he should for two years come to Washington to preside over the National Institution for the Promotion of Science. He was in fact reëlected to the presidency at every annual meeting until that of 1845, when, having declined candidacy, Senator Levi Woodbury was chosen president and Mr. Poinsett was unanimously elected an honorary member of the Institution.

From this period the decline of the society's prosperity was marked. It is more probable, however, that Mr. Poinsett's lack of interest was a result of the weakness of the society than that the weakness resulted from his lack of interest.

Perhaps, however, if Mr. Poinsett had been a resident of Washington rather than of South Carolina during the four years of his presidency, the result would have been different.

That Mr. Poinsett, as early as 1838, was thinking seriously about the disposition of the Smithsonian bequest is evident from an entry in the diary of John Quincy Adams, under date of December 8.* Mr. Adams was evidently suspicious, and believed that Mr. Poinsett did not give him his entire confidence. In April, 1839, he talked to him again, and in 1841 he wrote again in his diary: "April 17. Mr. Poinsett called upon me and now fully disclosed his project, which is to place the investment and disposal of the Smithsonian funds under the management of the American Institution for the Promotion of Literature and Science.† * * * He said that he had at present no other occupation on hand, and would be willing to devote two years entirely to organizing the establishment and getting it into full operation."

"I know not," continued the aged statesman, "that it could be accomplished more effectively, and think I must acquiesce in this arrangement and endeavor to carry it through."

Since the bills of Messrs. Linn and Preston had been already for two months before the Senate, it seems strange that Mr. Adams should have looked upon Mr. Poinsett's communication as a revelation—still more so when it is remembered how clearly he had expressed himself in his "Discourse" in January.‡

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* "Extracts from the Memoirs of John Quincy Adams": Rhees, Documents, etc., p. 769.

† Evidently meaning the National Institution.

‡ Mr. Poinsett was not only the first to publicly suggest the union of the Smithsonian with the National Institution, but was constant in his advocacy of the project. (See remarks, March 8, 1841, Proc. Nat. Inst., I, p. 69, and letter, February 7, 1842, Proc. Nat. Inst., I, p. 157.) Dr. Peter S. Duponceau, president of the American Philosophical Society in a letter to the institution in November, 1840, remarked: "Congress can not find a better opportunity to execute the will of that beneficent testator than by laying hold of your institution and making it its own." (Proc., p. 12.) The Hon. Virgil Maxey, Charge d'Affaires at Belgium, wrote in December, 1840, that in his opinion no better use could be made of the bequest than "to place it under the direction of a society organized for the proper carrying into effect views

Poinsett, when elected to the presidency of the National Institution, was a man sixty-two years of age, who had lived an eventful life, full of opportunities for observing the institutions of Europe, Asia, and South America. His culture was broad and sympathetic, and he was, perhaps, better fitted than any of the public men of his time to appreciate the necessity of organizing our public institutions on the most liberal and comprehensive plan.

In his interviews with those who advocated the establishment of an observatory as the first result of the Smithsonian legacy, he showed full appreciation of the value of such an institution, but seems to have kept before his own mind a much more comprehensive ideal.

Poinsett was the first to suggest the idea of a great national museum at the capital of the nation.

In his address upon "The Objects and Importance of the National Institution for the Promotion of Sciences," delivered at the first anniversary meeting of the society, January 4, 1841, he advocated boldly the formation of a national museum as one of the most important features of a "central establishment at the seat of government, such as is maintained in every country in Europe for the advantage of those who cultivated the arts and sciences."

To one who reads this address it will become evident that it was Poinsett who put in words the definition of the objects of the National Institution—"to promote science and the useful arts, and to establish a national museum of natural history."

The following is an extract from this address:

The lovers of science, literature, and the fine arts residing in the District felt sensibly the absence of those resources which are found elsewhere and are necessary for the attainment of knowledge. They were mortified to perceive that the great advantages possessed by the public authorities at Washington were neglected, and that, at the seat of government of this great nation, there existed fewer means than in any other city of the Union of prosecuting those studies which, while they impart dignity and enjoyment to existence, lead to the most useful practical results. They believed it to be their duty to arouse the attention of Government to these deficiencies, and, at all events, to address themselves to the task of supplying them, as far as could be done by their individual and combined exertions. For these purposes they have formed an association and applied themselves to collect

identical with those contemplated by the philanthropical and philosophical testator." (Proc., p. 46.)

See in this connection letters from Richard Rush, on the Smithsonian Bequest (Second Bulletin of Proceedings Nat. Inst., 1842, pp. 201–204); from Peter S. Duponceau, on the Smithsonian Bequest (*op. cit.*, 204–208); from Hon. Virgil Maxey, chargé d'affaires of the United States to Belgium (First Bulletin, pp. 46–47); Opening Address by John Tyler, President of the United States, patron of the National Institute (Second Bulletin, pp. 437, 438); letter from the Hon. Levi Woodbury, United States Senate (*op. cit.*, pp. 451–453); Smithsonian Bequest, by the Hon. Richard Rush (*op. cit.*, pp. 455–460); address of Hon. Mr. Preston, of the United States Senate (*op. cit.*, p. 236); letter of John Pickering, of Boston, September 1, 1841 (*op. cit.*, pp. 109–110).

specimens of geology and mineralogy and other objects of natural history, and, for the short period of its existence, the efforts of the Institution have been eminently successful.

They have entered into correspondence with other learned societies and have been encouraged to proceed by their approbation and profited by their generous coöperation. They have invited the assistance of their fellow-citizens in the most distant States and Territories, and hope, by their aid, to collect documents and facts illustrative of the early history of our country, specimens of its geology and of its mineral and vegetable productions, and, if not to preserve the animals and plants themselves, which are passing away before the progress of settlement and cultivation, at least to perpetuate their forms and the memory of their existence. They hope to be able to illustrate these subjects and others connected with them by a series of gratuitous lectures, and entertain a confident expectation that numbers whose duties compel them annually to assemble here will view with interest collections of the natural productions of America, drawn from every State and Territory in the Union, and, becoming sensible of their utility, will contribute on their return to swell their amount and to spread throughout the country a taste for literary and scientific pursuits.

In another place in the discourses of Mr. Poinsett we find avowals of plans and ambitious aspirations for the future of the National Museum which would satisfy the most ambitious of its supporters of today. He spoke thus:

Specimens of natural history are rapidly accumulating. The exploring expedition has already sent home a large collection, which remains packed away in boxes in a room belonging to the Philadelphia museum, generously loaned by the company for that purpose; and we may anticipate from the ability and well-known zeal of the naturalists who accompanied it by order of Government that the squadron itself, shortly expected, will return richly freighted with objects of natural history. I can not believe that after all the labor, pains, and expense incurred in procuring them these specimens are not to be brought to Washington, to be arranged and exhibited here. A geological survey of the Territory of Iowa was made a few months since by order of the Government, and numerous valuable specimens collected by Mr. Owen. Mr. Nicolet has brought with him interesting collections made in the country he visited, and Dr. King, of Missouri, lately sent to the lead region on business connected with the ordnance office, while there collected specimens of minerals which are likewise destined for Washington. The ordnance officers who have lately returned from Europe have brought with them numerous specimens of the iron ores used in the foundries there, and measures have been taken to procure, as objects of comparison, those of the United States.

Several individuals have transmitted donations to the Institution, while others have deposited their collections with us from a desire to have them preserved and, at the same time, to benefit science. We have reason to believe that this will be extensively done as soon as the Institution is firmly established. There are many of our countrymen who, like Sir Hans Sloan, the founder of the British Museum, look forward with regret to the sale and dispersion of their collections, made at great cost and pains, and, desiring to have them preserved entire, would deposit them with an institution which will be as stable as the Government that protects it.

In every country in Europe those who cultivate the arts and sciences

enjoy the advantage of finding in each capital a central establishment, such as we propose.

In London, the Royal Museum, which was commenced by the enlightened liberality of an individual, and subsequently enriched by similar bequests, and now liberally patronized by Government, possesses all that is necessary to protect and encourage literature, science, and the arts.

The Society for the Promotion of Science and the Useful Arts in Dublin, having an extensive museum of natural history, a botanic garden, and school of design, fulfills effectually the objects of its institution and justifies the very liberal patronage of the British Government. There students in every branch of science find the means of improvement, and some of the most accomplished artists in England have been instructed in this school.

In this country we are best acquainted with the museum, botanical and zoölogical gardens, and liberal course of instruction at the Jardin des Plantes, in Paris, where strangers resort from every quarter of the world to consult the collections and listen to lectures, which are open to all who choose to attend them. These courses of lectures are delivered by the ablest and most eloquent men in France, on every branch of science. In the summer botany is taught in a garden abounding in all the vegetable productions of the world; zoölogy in the midst of specimens of every known animal, and other branches of natural history, with the advantage of extensive collections, which are augmenting daily by an enlightened and active system of exchanges; chemistry and technology are illustrated by well-conducted experiments and admirably adapted apparatus, and every branch of natural philosophy taught with clearness and precision and explained by the most ample means of illustration. These lectures are attended by students who have completed their academic course and by men of science who seek to increase their knowledge.

There can be no doubt that a national institution, such as we contemplate, having at its command an observatory, a museum containing collections of all the productions of nature, a botanic and zoölogical garden, and the necessary apparatus for illustrating every branch of physical science, would attract together men of learning and students from every part of our country, would open new avenues of intelligence throughout the whole of its vast extent, and would contribute largely to disseminate among the people the truths of nature and the light of science.

A fortunate occurrence of circumstances offers a favorable occasion to carry all these important objects into immediate effect. A liberal and enlightened Englishman, foreseeing the benefits which would result to science throughout the world by its successful cultivation in the vast and extensive field offered by these States and Territories, with enlarged views and praiseworthy philanthropy has bequeathed a fund to be employed for the sacred purposes of increasing and diffusing knowledge among men. This bequest will enable the Government to afford all necessary protection to the promotion of science and the useful arts, without the exercise of any doubtful power, by the application of the annual interest of this fund to the establishment of an observatory, the erection of suitable buildings to contain the collections, and for lecture rooms, the purchase of books and instruments, and the salaries of professors and curators.

Poinsett's enthusiasm was contagious, and his arguments, based as they evidently were upon careful observations and judicious reasoning,

and inspired by hopeful patriotism, brought him many sympathizers. Among these the Hon. Levi Woodbury, who had been a member of the same Cabinet with Mr. Poinsett, and subsequently was in the Senate, Senator W. C. Preston, one of the directors of the Institute, Senator R. J. Walker, of Mississippi, Senator S. P. Linn, of Missouri, corresponding members, appear to have been especially friendly to the plans of Mr. Poinsett, and on various occasions promoted the interests of the National Institution on the floor of the Senate from 1841 to 1846.

In June, 1842, Mr. Poinsett was again in Washington, and on the 11th presided at a meeting at the home of Mr. Francis Markoe for the purpose of connecting the organizations of the National Institution with that of the Smithsonian Institution.

"Mr. Preston," wrote John Quincy Adams, "has introduced into the Senate a bill for combining these two institutions, and now stated to the meeting his views on the subject, embracing an appropriation of $20,000 and the occupation by law of a large portion of the Patent Office building for the preservation and arrangement of the objects of curiosity collected by the exploring expedition under Lieut. Wilkes, now daily expected home; and he called on me to say how far my purposes may be concurrent with these suggestions.

"I said I had the warmest disposition to favor them, and thought there was but one difficulty in the way, which might perhaps be surmounted. I had believed that the whole burden and the whole honor of the Smithsonian Institution should be exclusively confined to itself, and not entangled or commingled with any national establishment requiring appropriations of public money. I exposed the principles upon which all my movements relating to the Smithsonian bequest have been founded, as well as the bills which at four successive Congresses I have reported, first, for obtaining the money and then for disposing of the fund.

"At the motion of Mr. Walker, of Mississippi, the president, Mr. Poinsett, was authorized to appoint a committee of five members of the Institute, to confer with Mr. Preston and me upon the means of connecting the Smithsonian Institution with the National Institute."

Nothing seems to have resulted from these deliberations.

On the 13th of June, at a stated meeting of the National Institution, Senator Preston was present, and delivered, as the records inform us, "an eloquent speech, in which he descanted at length on the history and labor of the Institution, what it had done, and what it proposed to do, its capacity to be eminently useful to the country and Congress, the advantage of uniting the Smithsonian Institution with it, etc., and appealed to Congress and to the liberal citizens of the United States to come forward in aid of a glorious cause and in the accomplishment of the great national objects which the Institution has in view," * etc.

* Proceedings of the National Institution (3d Bulletin, 1845) vol. I, p. 236. A copy was requested for publication (*l. c.*, p. 241) but I can not learn that it was ever put *in type.*

Senator Preston's bill for the union of the two institutions came to naught.*

During this session, however, the act to incorporate the National Institute, as it was henceforth to be called, passed in a much modified form, and was approved July 27, 1842,† and the society now seems to have felt much more secure in its project of retaining the control of the National Museum, and either of gaining eventually the management of the Smithson fund or of obtaining an appropriation from Congress.

Senator Woodbury,‡ in commenting upon the form of the charter, remarked that—

Care was taken originally to make the institute different from all other chartered bodies even in the District, so as to elevate it above every motive of personal gain, dedicating its labors exclusively to objects of a public character and vesting all the property possessed for this purpose in the Government itself; and thus by rendering it national in substance as well as in name, to obviate any constitutional objection which might arise against measures in its behalf.

The change of the name from *Institution* to *Institute* seems to have been made in deference to a suggestion by Dr. Duponceau in a letter written April, 1842, in which he said:

I have seen with great pleasure the bill brought into the Senate by the Hon. Mr. Preston. It fully coincides with the views that I have expressed. The object, in my opinion, is to preserve the superiority of the National Institution over the Smithsonian, and of the Government over both.

I would beg leave to suggest whether it would not be advisable to make some small alteration in the name of the National Institution so that it should not bear exactly the same name with the Smithsonian, but one expressive of some degree of superiority. I would recommend, for instance, that of Institute, which appears to me more dignified than that of institution, which is equally applicable to a school or college as to a great national establishment for the promotion of science. My idea would be to call the national establishment the "National Institute for the Promotion of Science," and the subordinate one the "Smithsonian Institution," without more.

No appropriation came, however, and the charter and changed name failed to make the society more prosperous.

At a meeting June 20,§ 1842, a resolution was passed appointing a committee to solicit private contributions of money and property.

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*It was laid upon the table July 18, 1842, and never again taken up.

† See Charter of Incorporation, Constitution and By-Laws in Appendix to this report and in Proc. Nat. Inst., I. pp. 388–392. See also "Bill to incorporate the National Institution," etc., reported by Senator Preston (S. No. 258) February 17, 1841, in Rhees. Documents, etc., pp. 239-341. See also Memorial of the Officers of the National Institution for the Promotion of Science, January 21, 1842 (House Docs. No. 59, Twenty-seventh Congress, second session, II), submitting draft of a bill of incorporation.

‡ See remarks of Senator Woodbury in full, Proc. Nat. Inst., I, pp. 336, 337.

§ Evidently not June 13, though so stated in one portion of minutes. See Proc. Nat. Inst., I., pp. 236, 241, 335.

At another meeting, August 8, 1842, a report* was made by this committee in which they proposed to institute an annual scientific convention at Washington, during the session of Congress, and under the auspices of the institution, and also recommended an extensive system of exchange of specimens for the benefit of the museum.

At the meeting of September 12, 1842, Mr. Poinsett, the president, proposed a series of resolutions† intended to put the recommendation of the report into effect.

All of these resolutions and reports were issued in the form of circulars (October 15, 1842, and February 24, 1843), but the appeals "to the liberality and public spirit of our countrymen," were without avail.

Consequently a special meeting of the board of management was held December 23, 1843, at the office of the Secretary of State. That the society was regarded at that time as one of national importance is shown by the presence at the meeting of Mr. Upshur, the Secretary of State, who took an active part in the proceedings; the Hon. John Quincy

* The committee appointed to devise and execute such measures as should be deemed expedient to obtain contributions and other aid to the Institute would make an informal report.

They propose making an appeal to the public, by disseminating an account of the Institute, its past efforts, its condition, and its prospects, and an exhibition of the many reasons why it should be sustained and encouraged by the citizens of the United States. In their judgment the best means of doing this will be the publication of the remarks addressed to the Institute by the Hon. Mr. Preston, Senator from South Carolina, on the evening of the 13th of June last.

They also propose to address circulars to prominent individuals in the different States, inviting their coöperation, particularly in receiving and transmitting contributions.

They recommend that the Institute authorize the president and secretaries to sanction their circulars by their official signatures.

They propose that a meeting of the learned men of our country, distinguished for their attainments in the different sciences, particularly in those termed physical, should be held annually at the seat of the General Government, at some early period of the session of Congress, under the auspices of the Institute, to communicate the results of their inquiries, to compare their observations, and to promote the general interests of science. It has seemed to the committee that this Institute affords an opportunity, which ought not to be neglected, of concentrating the genius and learning of our country at a common center, from which the beams of intelligence will radiate to gladden and bless the land.

They recommend that, in addition to the powers already conferred, the committee be authorized to make arrangements for such a meeting, at a day as early as may be found practicable, and to invite the attendance of those who desire to participate in its proceedings.

They think that a system of exchanges of mineral and geological specimens, and perhaps of other articles, with the private and public collections in different parts of the Union, may be established with reciprocal advantage; and that the Museum of this Institute may, by these and other means, be enabled in time to exhibit the various treasures of our different soils; and they would suggest the appointment of a committee to whom this subject should be given specially in charge.—Proc. Nat. Inst., 1, 335.

† Proc. Nat. Inst., 1, 336.

Adams, who presided; Senator Levi Woodbury, late Secretary of the Treasury, who agreed to represent the meeting in Congress; the Hon. J. R. Ingersoll, who acted as secretary, and who wrote out in his preamble to the minutes of the meeting a forcible statement of the needs of the society; the Hon. C. J. Ingersoll, Senator R. J. Walker, besides Col. Peter Force, Col. Albert, Col. Totten, Lieut. Maury, and the officers of the society.

The issue of this meeting was the decision "to memorialize Congress on the subject of the condition and wants of the Institute."

The memorial was presented in due course of time, and in June, 1844, Senator Choate presented a report upon the character and uses of the institute, recommending that its property should be vested in the United States and an appropriation made for its benefit.

I have not been able to find a copy of this memorial, but since it was evidently prepared by Mr. J. R. Ingersoll* it is safe to assume that the grounds for asking aid were essentially those named in his "preamble" read to the society December 28, 1843.†

In the meantime, on the occasion of the first annual meeting of the National Institute (under its new name and in its capacity as a corporation) in April, 1844, the meeting of the friends of science, including, besides all the members and patrons of the National Institute, the members of the American Philosophical Society and of the "Association of American Geologists and Naturalists" (the predecessor of the American Association for the Advancement of Science), had been held in Washington. The occasion was a brilliantly successful one. The President of the United States presided at the first meeting and some prominent public men at each of the others.

The National Institute received its full share of encomium. President Tyler lauded it highly, held out the hope that the Government would "continue to it a fostering care," and expressed in a general way the hope that it should be identified with the future National Museum and the future Smithsonian Institution.

"Where can the Government find," said he, "a safer depository for the fruits of its expeditions, fitted out to explore distant and unknown regions, than the National Institute? What can it better do for the 'increase and diffusion of knowledge among men' than by patronizing and sustaining this magnificent undertaking?"

Senator Walker, of Mississippi, one of the directors of the institute, delivered a very appreciative introductory address on the present condition and history of American science, ending with an appeal to scientific men to come forward and unite with the people in sustaining and advancing the National Institute.

* At the meeting of May, 1844, the Hon. Joseph R. Ingersoll offered remarks upon the pecuniary embarrassments of the Institute, and expressed a hope that Congress would furnish the required aid. Proc. Nat. Inst., I, p. 359.

† Proc. Nat. Inst., I, p. 332.

Senator Woodbury, in a letter to the secretary of the institution, expressed himself strongly in favor of making the society the agent of the Government in the matter of caring for collections, patents, and copyrights, and also in the execution of the Smithson trust.

John Quincy Adams closed his address in these words:

I avail myself of this occasion to express my regret that, having taken an humble part in the establishment of this Institution from its first foundation, under the auspices of Mr. Poinsett, I have been able to contribute so little to its promotion and advantage, and to add my heartfelt satisfaction at the prosperity which, by the untiring exertions and fervid zeal of its executive officers, it has attained. I believe it eminently deserving of the fostering care and liberal patronage of the Congress of the United States, and could anticipate no happier close to my public life than to contribute, by my voice and by my vote, to record the sanction of the nation's munificence to sustain the National Institute devoted to the cause of science.

The Hon. Richard Rush, in a paper on "The Smithsonian Bequest," submitted to this meeting, urged that the Smithsonian fund should be "engrafted upon the National Institute," and submitted an elaborate argument in favor of his proposal.

It was a gala week for the National Institution. The meeting was in every respect a success, and there was every reason to believe that Congress would share in the general enthusiasm, and take the society under its patronage.

In the circular of invitation dated March 5, 1843, the objects of the meeting as a means of strengthening the position of the society had been boldly stated, and the committee did not hesitate to say that "should the meeting prove as successful as the hopes of the managers in relation to it are ardent, they will expect hereafter to welcome all who may visit the association in apartments peculiar to itself, stored with the objects of its honest pride and worthy of its distinguished visitors."

Such a paper signed by such influential names as those of John C. Spencer, Secretary of the Treasury, R. J. Walker, W. C. Rives, Rufus Choate, of the Senate, J. R. Ingersoll and W. C. Preston, of the House of Representatives, A. D. Bache, Superintendent of the Coast Survey, and Abbott Lawrence, of Boston, was surely a powerful campaign document.

None the less weighty was the "Memorial of the Friends of Science who attended the April meeting of the National Institute," signed by nearly forty representative scientific men and college presidents from all parts of the United States, speaking in terms of high commendation of the National Institute, and particularly of the extent and value of its museum material, and expressing the hope "that the enlightened and intelligent members of Congress will distinguish the present session by the appropriation of funds to an object so truly national and so truly republican.

This indorsement of the museum work of the institute is very cordial and comprehensive, and very significant; is indicative of a decided growth in public opinion in regard to museums—a growth largely due in the first instance to the suggestions and later to the fostering care of Mr. Poinsett and his society, the National Institute.

The hopes of the promoters of the institute were doomed to disappointment. Congress adjourned without making any provision for its needs.

On the 12th of July a new scheme was proposed for collecting money from private sources by the efforts of trustworthy agents, and in December a committee was appointed to again memorialize Congress.*

The movement had received its death blow, however. The failure of the tremendous effort of April, 1844, disheartened all its friends. At the next annual meeting Mr. Poinsett declined reëlection to the presidency. The society's publications were discontinued, and even the annual address of Senator Woodbury, solicited for publication by the society, seems to have remained in manuscript unprinted.

No more meetings were held, no more bulletins printed, the magnificent list of 350 resident and 1,250 corresponding members began to grow shorter. An effort was made to revive it in 1847, and a meager report was made once afterward by the corresponding secretary. In 1855 it was brought into existence for a time as a local scientific society, and issued a new series of proceedings.† Its glory departed, however, with the first annual meeting in 1844, and the attention of Congress was directed toward the organization of the Smithsonian Institution.

The influence of the National Institute upon the history of science in the United States, and particularly in educating public opinion and the judgment of Congress to an application of the proper means of disposing of the Smithsonian legacy, can not well be overestimated.

If the Smithsonian had been organized before the National Institute had exerted its influences, it would have been a school, an observatory, or an agricultural experiment station.

In 1846, however, the country was prepared to expect it to be a general agency for the advancement of scientific interests of all kinds—as catholic, as unselfish, as universal as the National Institute.

The National Institute, after nearly five years of activity, suddenly ceased to be a center of public interest. The struggle over the Smithsonian bequest, however, still continued. During the Twenty-seventh Congress, 1841–'43, the Senate did nothing. The House of Representatives appointed a select committee on the subject, and Mr. Adams as its chairman reported a new bill, providing still more thoroughly for the erection of an observatory and the publication of a nautical almanac to be called the Smithsonian Almanac. Petitions continued to come

* Proc. Nat. Inst., I, p. 375.

† Prof. Henry was for a time an officer, and endeavored to have its name changed to "Metropolitan Institute."

in, some urging action, and asking for the establishment of prizes for scientific essays, another for the establishment of an agricultural school and farm in the District of Columbia. The National Institution had perhaps fallen somewhat into disfavor with Congress—or, it may be, had become so prominent as to awaken feelings of opposition.

The Twenty-eighth Congress (1843–'45) brought their deliberations more nearly to an issue.

The astronomical observatory bill (H. R. 418, Twenty-eighth Congress) was again presented by Mr. Adams, but not acted upon. In the Senate, both in the first and second sessions, a bill for the Smithsonian Institution was reported, June 6, 1844, by the Committee on the Library, through Senator Tappan, which, before it was finally brought to a vote, was brought into a form somewhat resembling that which finally was adopted. It provided, however, for the appointment of various professors and lecturers for a school of agriculture and mechanical arts, as well as for experimental gardens, a library of science and economics, and a museum,

The museum clause of this bill was much the same as that finally agreed to, and contained a provision that the natural history objects, and geological and mineralogical specimens belonging to the United States, "in whosoever custody the same may be," should be transferred to the custody of the board of managers of the Smithsonian Institution.

This was evidently worded with the purpose of withdrawing from the possession of the National Institution the various collections, including those which had belonged to Smithson, which had fallen into the hands of that society between 1840 and 1845. Indeed, the national institution seems to have already become the object of some distrust and prejudice. A proposition that two of the seven "managers" not ex-officio members of the board should be selected from the membership of the national institution caused a vigorous debate in the Senate, in the course of which at least two Senators objected strongly to placing the administration of the Smithsonian Institution, even to so slight a degree as this, in the hands of a private corporation.

The act finally passed the Senate, but was not acted on by the House.

In connection with Mr. Tappan's bill, in January, 1845, Senator Choate, of Massachusetts, first appeared in advocacy of the establishment of a great library, and delivered his famous oration upon the influence of books. The amendment at that time proposed, together with the amendments urged by Mr. George P. Marsh, in connection with the Owen-Hough bill, brought forward in the following session, had a great influence upon the final adjustment of the plan of administration.*

To the Twenty-ninth Congress (1845–'47) belongs the honor of finally formulating the act of incorporation by which the Smithsonian Institution was established.

* See report of Hon. James Meacham, 1854, pp. 10–12.

This was done through Robert Dale Owen, of Indiana, who reported the bill nearly in its final form. John Quincy Adams was a member of the select committee to whom it was referred, together with Mr. Owen, chairman, Mr. Jenkins, Mr. George P. Marsh, Mr. Alexander D. Sims, Mr. Jefferson Davis, and Mr. Wilmot.

Mr. Adams was now for the first time willing to omit his advocacy of a Smithsonian Astronomical Observatory, the Naval Observatory having now been organized, and being, as Mr. Owen remarked, "at least equal in everything but the experience of its observers to the Royal Observatory at Greenwich."

It is not my purpose to describe the growth of the Smithsonian plan of organization, except in its bearings upon the development of the museum idea.

In the bill proposed by Robert Dale Owen in 1846 the National Institute was recognized to the extent of placing two of its members on the Board of Managers, an arrangement which was continued in the Board of Regents in the Hough bill which finally passed.

An amendment to the Owen bill, proposed by Joseph R. Ingersoll, and passed, and which, had it not been superseded in the Hough bill, would have given the National Institute a strong and perhaps permanent hold upon the national collections, read as follows:

SEC. 5. *And be it further enacted*, That, in proportion as suitable arrangements can be made for their reception, all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington, in whosesoever custody the same may be, shall be delivered to such persons as may be authorized by the Board of Managers to receive them, and shall be arranged in such order, and so classed, as best to facilitate the examination and study of them, in the buildings so as aforesaid to be erected for the institution; and the managers of said institution shall afterwards, as new specimens in natural history, geology, or mineralogy may be obtained for the museum of the institution, by exchanges of duplicate specimens belonging to the institution (which they are hereby authorized to make), or by donation, which they may receive, or otherwise, cause such new specimens to be also appropriately classed and arranged. And the minerals, books, manuscripts, and other property of James Smithson, which have been received by the Government of the United States, and are now placed in the Department of State, shall be removed to said institution, and shall be preserved separate and apart from the other property of the institution.

SEC. 6. *And be it further enacted*, That the managers of said institution shall appoint a Superintendent, whose duty it shall be to take charge of the ground, buildings, and property belonging to the institution, and carefully preserve the same from injury; and such Superintendent shall be the Secretary of the Board of Managers, and shall, under their direction, make a fair and accurate record of all their proceedings, to be preserved in said institution; and the said Superintendent shall also discharge the duties of librarian and of keeper of the museum, and may, with the consent of the Board of Managers, employ assistants; and the said managers shall appoint a professor of agricul-

ture, horticulture, and rural economy; and the said professor may hire, from time to time, so many gardners, practical agriculturists, and laborers as may be necessary to cultivate the ground and maintain a botanical garden; and he shall make, under the supervision of the board of management, such experiments as may be of general utility throughout the United States, to determine the utility and advantage of new modes and instruments of culture, to determine whether new fruits, plants, and vegetables may be cultivated to advantage in the United States; and the said officers shall receive for their services such sum as may be allowed by the Board of Managers, to be paid semi-annually on the first day of January and July; and the said officers, and all other officers of the institution, shall be removable by the Board of Managers, whenever, in their judgment, the interests of the institution require any of the said officers to be changed.

In the Hough bill there was an attempt of another kind to weld together the fate of the Smithsonian Museum and the National Cabinet of Curiosities, by giving to the Board of Regents the authority to erect a building by the side of the Patent Office, so as to form a wing of that structure, and to connect it with the hall then containing the National Cabinet, so as to constitute that hall in whole or in part the depository of the cabinet of the institution.

This was discretionary, however, with the Regents, who fortunately did not look upon the plan with favor.

Reference has been made to the marked similarity between the plans of organization of the National and Smithsonian Institutions. In addition to the feature of museum custody, which has already been discussed, there were others no less significant.

The National Institution, like the Smithsonian Institution, had a superior board of officers, composed of the President of the United States and the members of his Cabinet. It had also a board of directors, which included in its membership delegates from the Senate and House of Representatives, corresponding in function to the Smithsonian Board of Regents. In other respects, still more markedly than in the constitution of its governing board, the Smithsonian seems to have been organized with the plan of the National Institution in view. The objects, as defined in the Congressional act of establishment (sections 5 and 6), correspond very closely to those announced in the early publications of the National Institution.

The institution at its foundation divided its members into eight classes, as follows:

I. Astronomy, Geography, and Natural Philosophy;
II. Natural History;
III. Geology and Mineralogy;
IV. Chemistry;
V. The application of same to useful arts;
VI. Agriculture;
VII. American History and Antiquities;
VIII. Fine Arts;

and in all these classes, except the fourth, made plans for the collection of museum material. Ethnography was grouped by Mr. Poinsett with geography, with which he states that it is "intimately connected, and indeed forming a part of it until it was lately erected into a separate science."

It is worthy of remark that the term "manager,"* to designate a member of the governing board, was employed in every bill, except in the substitute which was proposed only a few hours before the final action, and that when the election of the first Secretary was held Francis Markoe, jr., who had been for six years Secretary of the National Institution and was more than any one else perhaps identified with its interests, received four votes against seven cast for Prof. Henry. Dr. Charles Pickering, the Curator of the National Institution, also received one vote.

The term "curator," as applied to an officer in charge of the national collections, then came into use for the first time.

THE NATIONAL CABINET OF CURIOSITIES.

The formation of a "national museum" was one of the professed objects of Poinsett and his associates in the National Institution, but it does not appear that they ever dignified with that name their collections, which were usually modestly referred to as constituting the "cabinet"† of the Institution, both in the constitution and in the proceedings of the society.

In the Hough bill for the organization of the Smithsonian Institution in 1846, the collection in the Patent Office was officially designated as the National Cabinet of Curiosities, a name which though never in general use is very appropriate and convenient for use in designating the as-

*The term *regent* was undoubtedly suggested by the organization of the University of the State of New York, a term peculiar to Mr. Hough, the mover of the substitute, who was a representative from that State and who in all probability had been one of the board of regents of that University.

The Hon. W. J. Hough was the first Secretary of the Institution. Having been elected to that office September 7, 1846, he served until the election of Prof. Henry on December 3. Mr. B. B. French was elected assistant secretary, and appears to have served until the election of C. C. Jewett, and at a meeting of the board in December submitted a report for the Secretary.

†In 1790 a law was passed by Congress "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." [Sec. VIII, par. VIII.]

In this was gathered a collection of models, which was sometimes by courtesy called "The American Museum of Arts," but which had no title to the name either by law or by courtesy. This was destroyed by fire December 15, 1836.

In "An act to promote the progress of the useful arts, etc.," approved July 4, 1836, provision was made for the preservation and display, under the charge of the Commissioner of Patents, not only of models, but of "specimens of compositions and of fabrics and other manufactures and works of art." [Sec. XX.]

semblage of miscellaneous objects for a time exhibited in the Patent Office building.

From 1847 to 1851, however, there was no use of the term National Museum, the collections of natural history which were accumulating under the care of Prof. Baird constituting for the time being the "Museum of the Smithsonian Institution."

The National Cabinet of Curiosities, carrying with it a certain official atmosphere as well as an annual appropriation, was, however, one of the parents of the greater establishment yet to come. Of its marriage with the Smithsonian Museum, the National Museum of the United States was the offspring.

The Smithsonian cabinet of minerals and meteorites was, as we have seen, the first scientific collection which belonged to the United States, coming into the custody of Mr. Rush in June, 1838.

Of all the expeditions sent out by the Government, none previous to the Wilkes exploring expedition, sent out in 1838, was instructed to bring back collections of natural history.

In the earliest days of our Republic the cabinet of the American Philosophical Society of Philadelphia was doubtless the official museum, and this was enriched by the efforts of the only naturalist President, Thomas Jefferson.

The first exploring expedition, that of Lewis and Clarke, in 1803, was sent out by Jefferson, who twenty-three years before, in 1780, began to agitate the question of exploring the unknown West, and who at that time offered to raise 1,000 guineas for the purpose from private sources. Lewis and Clarke returned in 1806, bringing with them some valuable scientific material, zöological and ethnological. Some of the animals appear to have found their way to Peale's Philadelphia Museum. Godman in his American Natural History mentions a sable which had been obtained from this source and was to be seen there in 1823. I have been told that within a few years Indian garments and weapons, brought back by this party, were to be seen in St. Louis. Pike's expedition in 1805, the second of the exploring enterprises, yielded little in the way of scientific material. Whatever there was went undoubtedly to the Philadelphia Museum, and in 1808 there were still on exhibition at that place two grizzly bears which as cubs had been brought by Maj. Pike from the region of the Rio del Norte and presented by him to President Jefferson, who gave them to Mr. Peale for his museum. Other specimens appear to have found shelter in the University of Virginia, where two sets of antlers, brought back by Capt. Lewis, are still preserved.

In 1820 a third expedition was sent by the General Government to explore the Northwestern Territory, especially the region around the Great Lakes and the sources of the Mississippi. This was under charge of Gen. Lewis Cass, at that time governor of Michigan Territory. Henry R. Schoolcraft accompanied this expedition as mineralo-

gist, and Capt. D. B. Douglass, U. S. Army, as topographical engineer; and both of these sent home considerable collections reported upon by the specialists of the day, most of whom were at that time concentrated in Philadelphia.

The fourth and fifth expeditions were those under Maj. Long, in the far West; the first, or Rocky Mountain, exploration in 1819–'20; the second, to the sources of the St. Peter's in 1823. In the first expedition Maj. Long was accompanied by Edwin James as botanist and geologist, who also wrote the narrative published in 1823. The second expedition was accompanied by William H. Keating, professor of mineralogy and chemistry in the University of Pennsylvania, who was its geologist and historiographer. Say was the zoölogist of both explorations, and the results of his labors went to the Philadelphia Museum.

The sixth Government expedition was that by G. W. Featherstonhaugh, in 1834–'35, to explore the geology of the elevated country between the Missouri and Red rivers and the Wisconsin territories. I have found no record of the disposition of his collections, but it is not improbable that he may have carried them with him to England.

The seventh expedition was that under Lieut. Wilkes, already referred to as having been sent out in 1838, under the direction of President Van Buren, who seems to have intrusted the plans very largely to Mr. Poinsett, who was the first to urge the formation of a national museum, and to whom was doubtless due the insertion of the clause instructing the officers to preserve and bring back collections in natural history, a precaution which might easily have been overlooked, since the expedition was organized professedly in the interests of the American whale fishery.

It was, perhaps, the fact that there was no suitable depository for collections at the seat of government that stimulated Mr. Poinsett to immediate action in 1840, when he founded the National Institution, the arrival of these collections from the Pacific being at that time expected.

The purpose of Mr. Poinsett's efforts is shown clearly in his first anniversary address.

"There are many of our countrymen," said he, "who, like Sir Hans Sloane, the founder of the British Museum, look forward with regret to the sale and dispersion of their collections, and desiring to have them preserved entire would deposit them with an institution which will be as stable as the Government that protects it. For these purposes, and especially if the National Institution be intrusted, as we hope it will be, with the specimens of natural history collected by the exploring squadron, it will be necessary that measures should be early adopted to have erected on a suitable site a plain, fireproof building, where the increasing and valuable collections may be displayed and examined by the scientific inquirer. We cherish the hope that they will form the foundation for a national museum and contribute to shed the light of science over our land."

"The exploring expedition," he continued, "has already sent home a large collection, which remains packed away in boxes in a room belonging to the Philadelphia Museum, generously loaned by the company for that purpose; and we may anticipate, from the ability and well-known zeal of the naturalists who accompanied it, that the squadron itself, shortly expected, will return richly freighted with objects of natural history. I cannot believe that, after all the labor, pains, and expense incurred in procuring them, these specimens are not to be brought to Washington to be arranged and exhibited here."*

Mr. Poinsett was at this time still Secretary of War, and had the power to effect at least the beginning of what he desired to see done, and one of his last official acts was to persuade his colleague, James K. Paulding, the Secretary of the Navy, to order these collections forwarded from Philadelphia.

In February the Institution was informed "that about one hundred and fifty boxes, the results as far as have been received of the exploring squadron's exertions, containing a variety of interesting objects of natural history, and destined for the cabinet of the Institution, have been shipped at Philadelphia, and are expected as soon as the navigation opens."†

Here, again, Mr. Poinsett's prompt action told in the interest of the future national museum. If he had waited till the navigation opened he would have been obliged to treat with the Secretary of the Navy.

The entirely unorganized condition of affairs in Washington and the lack of experience in museum administration is shown by the fact that Mr. W. McGingan, curator of the Philadelphia Museum Company, thought it necessary to write the following amusing cautionary letter, which was printed in the bulletin of the Institution:

It would be unadvisable to break open the cases containing the articles collected by the South Sea exploring expedition until such period as they are unpacked to be prepared for exhibition. The immense quantity of arsenic and corrosive sublimate necessary for their preservation requires, respectively, that very great caution should be observed, and that the handling and arrangements should be under either the immediate inspection or personal attention of one fully adequate to all the details connected with this subject.

In the hands of inexperienced persons, death might be the result.

W. McGINGAN.

PHILADELPHIA, *February 6, 1841.*

Still another step was taken on March 3, 1841, the day before the final adjournment, which I am also disposed to attribute to the forethought and interest of Mr. Poinsett, which was the appropriation by Congress of $5,000 "for defraying the expenses of transporting to the city of Washington and of arranging the collections made by the exploring expedition."

The committee, consisting of Col. Abert, Mr. Markoe, Mr. Dayton, and Dr. King, appointed under a resolution passed at the stated meet-

* Discourse, etc., 1841, p. 50.

† Proceedings, p. 48.

ing of the National Institution on the 13th December, 1841, which is in the following words:

Resolved, That a committee of four members be appointed by the chair to examine the subject of exchanges, to propose a plan for that purpose, and to report fully thereon to the institution for its further consideration and action—

beg leave, in pursuance of the directions of the said resolution, to report:

That the duty devolved on the committee by the resolution is, first, to examine the subject of exchanges; second, to propose a plan of exchanges; and third, to report thereon to the Institution. In reference to the first point, viz, "the examination of the subject," the committee state that they have examined the subject, and that the result has been a full conviction of mind that a system of exchanges is of very great importance in the accomplishment of one of the primary objects for which the National Institution has been declared to be formed, viz, "the establishment of a national museum of natural history," etc. Exchanges enter essentially into the plan of every society constituted as the National Institution and having like objects in view, and no occasion has been omitted to acquaint societies and individuals, whose correspondence has been sought by or offered to the National Institution, that a system of general exchanges would be entered upon as soon as the Institution should be able to mature a plan for that purpose. Under this assurance, and independently of it, also, it should be added, valuable collections of various kinds have already been received by the institution, which is thus already placed in a position which makes it incumbent on us to redeem the pledge that has been given. The committee consider it superfluous to dwell upon the advantages of exchanges, but they wish the members to know that for this object they have already in hands the most abundant materials—materials which are increasing and will continue to increase every day. These materials consist of contributions made by members, by individuals who are not members, by societies and institutions at home and abroad, and by foreign governments, as well as of those accessions that have been made by the exploring expedition, which has already sent home an inexhaustable quantity and variety of duplicates. It is well known to the institution that the collections received from all these sources are equally and absolutely the property of the Government, and that therefore the permission of the Government is indispensable to enable the Institution to part with the duplicates derived from all these sources. This permission, it is believed, will be cheerfully accorded. At the same time the committee, for obvious reasons, do not think it proper to ask the Government to allow the Institution to part with any of the duplicates of the exploring expedition until the squadron shall have returned.

In reference to the second point, viz: A plan of exchanges, the committee do not feel called upon or competent to enter into details. These must be left in a good degree to those whom the Institution may see fit to charge with the execution of the plan, in which of course they will be governed by the practice of other institutions, and by such regulations as it may become expedient to adopt from time to time to suit our own convenience and peculiar circumstances. Here, however, on the threshold of the plan which the committee mean to propose, they regard it of consequence to suggest for the sanction of the Institution that in exchanges of all kinds the natural productions of our country shall first and always have a decided preference. A great and leading

design of the National Institution is to explore and develop our own resources, and to study and describe the natural history of the United States. To this end our exertions must principally be directed. It should be the pride of all connected with or interested in a *National* Institution, to see every State in the Union fully represented in a national cabinet established at the seat of government. This method, while it recommends itself to us and our interests, is calculated to extend benefits and encouragement to the societies and naturalists of our own country, who will thus have a central depository from which they may enlarge and vary their own collections; and thus, also, in due time, the duplicates of the exploring expedition may, with the greatest advantage, be diffused throughout the land, thereby fulfilling, in the amplest manner, the intentions of those who projected, and justifying the liberality of the Government which sanctioned that noble project.

With these preliminary remarks, and under the restrictions which are embraced in them, the committee recommend—

First. That a system of exchanges be entered upon without delay.

Second. That the curator and assistants be directed, for this purpose, to separate all duplicates, except those from the exploring expedition; and that they select and label such specimens as are to be sent to individuals or societies.

Third. That the first step taken be to discharge the obligations of exchange already incurred by the Institution.

Fourth. That a committee be appointed, to whom the curator shall submit all sets of specimens thus set aside for any given exchanges, who shall decide upon the equivalency before said specimens shall be boxed up and sent off.

Fifth. That in all cases of difficulty which may arise, reference must be made to the president or vice-president of the Institution for decision, who will, if they conceive it necessary, submit the question to the Institution.

Sixth. That a book be kept by the curator, subject at all times to the inspection of the committee, in which must be noted the contents of each box or package; lists of the articles for which they are the equivalents; the name and place of the society or individual to whom one set is to be sent, and from whom the other has been received.

In what the committee have now submitted, they conceive that they have done all that it was possible or necessary to do at present in reference to the third point of the resolution, viz: "reporting fully on the subject"; although they are perfectly sensible that in their report they have presented the subject in the most general manner, believing that experience and practice alone will enable the Institution gradually to settle upon a complete system. The committee beg leave to add that the present report is not to be regarded as final, but that it is submitted, with all due deference to the institution, to use the concluding words of the resolution, "for its further consideration and action."

Shortly after this, on March 8, in order to provide for the reception of these collections, Dr. Henry King* was elected curator of the Na-

* Henry King, M. D., was a geologist and mining expert who had been a resident of Missouri, who had lately been employed in an exploration of the lead mines of the West, and who at this time was employed by the War Department in Washington. He was the author of a manual of "Directions for making collections in Natural History," published in 1840 by the Institution, the first part of a long series of pamphlets of scientific instructors, printed at the capital. [1840. King, Henry.

tional Institution, the first in Washington to bear an official title which has since been the designation of a goodly number of worthy workers in science.

The curator, although an elective officer of the Institution, received his pay from the Congressional appropriation already referred to, an arrangement not unlike that which prevails to this day in the National Museum, where the officers, chosen by the Smithsonian Institution, are paid by the General Government.

The collections arrived some time in March, and in response to its request Mr. Badger, the newly made Secretary of the Navy, placed them under the care of the National Institution, and in April, as we learn from the unpublished letters of the curator, the taxidermists were preparing about fifteen bird skins a day, a rate of speed which quite explains the atrocious condition of the preparations which have come down to us from those days of the infancy of the National Museum. In May additional collections, brought by the ship *Suzanne* to New York and thence trans-shipped by the schooner *Palestine*, were received in Washington.

A new danger now threatened the integrity of the collections, which was that the curator found many of the boxes "marked in such a manner as to indicate that they belong to and are claimed by private persons," these constituting a large part of the whole.

Here, again, Mr. Poinsett had foreseen and provided against the danger, having instructed the curator, on a previous occasion, to pay no attention to private marks on collections received from a Government expedition.

The question was submitted to the Secretary of the Navy, who at once replied that, in his opinion, "all specimens collected by officers attached to the expedition belonged solely to the United States."

In April, 1841, the collections and library of the Institution were installed in the new Patent Office building, where they remained until removed to the Smithsonian, in 1857.

Extensive plans were made for a system of international exchange, and a committee formulated the policy of the society in an elaborate report.

Another Government collection soon came in consisting of the minerals and geological specimens gathered by David Dale Owen, during his survey under the direction of the United States General Land Office, also a collection of "Indian portraits and curiosities" transferred by the Secretary of War, and the Smithson cabinet, books and minerals, deposited by the Secretary of the Treasury, and a bill was passed by Congress, less important by reason of the appropriation of $500, which

Directions for making Collections in Natural History. Prepared for the National Institution for the Promotion of Science; by H. King, M. D.—Washington. Printed by Gales & Seaton. 1840. 8vo., pp. 1-24.]

Dr. King was elected curator March 8, 1841, and held the office until September 12, 1842, when he was succeeded by Dr. Charles Pickering.

it makes, than from the fact that it justifies the Secretaries of War and of the Navy in transferring collections in their possession to the Institution.

On the 1st of January, 1842, a letter was written by a committee of the National Institution to the Secretaries of War and the Navy.

In February, 1842, another important paper was presented to the Institution by the same committee—important as marking the beginning of the system of exchanges and distribution of duplicates which had for nearly forty years been so important a feature of the work of the National Institution.*

With the exception of the papers already alluded to, which had reference to the relation of the society to the Government, and to the Smithsonian bequest, the bulletin of proceedings from this time on contained little more than the record of the receipt of donations of specimens and of letters asking information or proffering advice. The society retained the control of the exploring expedition collections, and in June, 1842, Lieut. Wilkes having returned to Washington, he, at three successive meetings of the Institute, gave a history of his voyage and its results. He was at first subjected to some opposition, and until after a court-martial, held in New York in August, seems to have been disposed to say very little. He, however, wrote, under date of July 16, 1842, a letter† to Senator Preston, in which he indignantly protested against the manner in which his officers and men had been received on their return.

When he was restored to favor and influence he at once took steps to gain control of the collections made by his squadron, provisionally under the charge of the National Institution, with results to be studied later.

* This is printed in Note A from the MS. report in the archives of the National Museum.

† This letter, now in the archives of the Museum and never published, is of so much interest historically, that after the lapse of nearly fifty years it is printed, in the certainty that its harsh significance has all vanished.

WASHINGTON CITY, *16th July, 1842.*

MY DEAR SIR: Agreeably to your desire, I hasten to give you the information relative to the remaining duties of the expedition, and that are *absolutely* necessary to carry out the intention of Congress in passing the act authorizing the expedition, viz, "for the promotion of the great interests of commerce and navigation, and to extend the bounds of science and promote the acquisition of knowledge."

For the accomplishment of these great objects, there was required persons to attend to the different departments of science, and the following was the organization which I proposed, and was adopted by the Government, and the most economical one that could have been arranged to carry out the great view intended, and that the accommodations of the fossils would permit, viz:

The department of astronomy, hydrography, magnetism, meteorology, and physics, including the experiments with the invariable pendulum, was confided to myself with the officers under my command as assistant. Besides the above I was charged with the history or narrative of the voyage.

This at once greatly reduced the scientific corps which had been organized, viz, from 23 to 9. I felt the Navy was justly entitled to all these departments, embraced as they were within the limits or scope of the profession, and that they ought not to be attached to such an undertaking to act as the "hewers of wood and drawers of water," as was the case in its original organization.

Charles Pickering, naturalist; Titian R. Peale, philologist; Horatio Hale, geologist; James D. Dana, botanist; William Rich, horticulturist and assistant; William *Brackenridge, botanist*; Joseph Drayton, artist; Alfred Agate, artist; J. G. Anthony,

In September, 1842, Dr. Charles Pickering became curator. He had been a member of the Wilkes exploring expedition and was occupied during his connection almost entirely in the work of unpacking and arranging its collections.

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conchologist, who was with the expedition until the end of November, 1839, after which period his duties were divided among the rest and successfully performed. These formed the nine; to these was added a mechanic for the repair of instruments and their proper preservation.

In all the above departments much remains to be done; indeed, I view the services of the above gentlemen as necessary now, and even more so than at any other period of the cruise, nor can their services be dispensed with, or the work concentrated, without great loss to the expedition and the reputation of the country. For my own departments I require the services of Mr. Stewart, who was a clerk in the expedition, but whom I have made hydrographical draughtsman, and some few of the officers, who have been my principal assistants. Mr. Stewart will be enabled also to assist me in copying, etc. He is one of my own scholars and is now engaged in the duties assigned him.

I truly regret that anything should have occurred to dampen the ardor of those who are attached to the expedition and absolutely necessary to the bringing out the results. The ardor that has been felt during the cruise has been all-important to our success, and has been in every way encouraged by me, and I did hope that it would have been kept alive until all had been accomplished. The reputation of our country is at stake, and if what has been attempted and succeeded in is not now finished, from any motive of economy, or derangement of the organization will be ruined, and it shall become the laughing stock of Europe, and all the praise that has been lavished on our Goverment for its noble undertaking prove but "satan in disguise."

What will be the reputation of those who have had the ordering of things since its return, on their becoming known on the other side of the waters? For the reception of myself I can easily account; but that of the officers and crews is truly unaccountable, particularly the want of any expression of thanks from the department to the latter on their discharge; it was felt by every officer and remarked by every man. On minor duties I have been gratified by it formerly, and I have with pleasure seen its effects upon many of the men that formed a part of the crew of this expedition when on other service with me. I have urged it all in my power, but without effect; every day develops some new opposition to the expedition. I am aware you think I want cause for this opinion; perhaps I am mistaken, but I cannot but feel myself bound up in it; indeed it would be strange if I was not, and I must say it is heartsickening to me to hear those who have shared its dangers and troubles complaining of a want of attention and courtesy and exhibiting the unceremonious discharges from their duties, with little or no prospect of consummating the labors in which they have been engaged for the last four years, and before they have even seen their families. Some are suffering under sickness contracted from their exposure in the service of their country. They are now suddenly cut off and destitute of support for themselves and families. These facts are well known. Such treatment is without precedent in the service of this or any other country.

Contrast our expedition with those of the French and English engaged in the same service and at the same time; honor and rewards are heaped on all at and before their return. Examine our results, compare them with theirs, contrast us in every way with them you please, or with expeditions that have gone before us, and then ask if we have not reason to feel mortified.

Do not misunderstand me. I ask nothing for myself at present, and will not as long as this mist hanging over me exists, but which any fair and candid examinations into my actions and conduct would have long since dissipated, neither do I ask impossibilities or undeserved praise; no greater punishment can be inflicted on the head of one who receives it. But I would ask: Is it not fully apparent and placed beyond cant that the men of the expedition have done their duty, and did deserve the thanks of the Department before they were disbanded?—it was openly complained of when they were paid off.

I have greatly to complain of the course the Department has pursued towards myself, but I forbear to touch on this subject at present.

In conclusion, my dear sir, I beg you will excuse this long letter and its tone. Whenever these subjects are brought to my mind I feel it acutely. All I do hope is that for the credit of the expedition, the honor and reputation of the country, you will not lose sight of what ought to be done. Fully confident I am that there is no subject in which the reputation of our country is so much at stake as the development of the results of the exploring expedition and on which its conduct will be so closely scrutinized abroad. I have the honor to be, with great respect,

Yours, most truly,

CHARLES WILKES.

Hon. WM. C. PRESTON, Senator, U. S., Washington.

In the meantime, in February, 1842, Dr. J. P. Couthouy, one of the naturalists of the expedition, having been detached from duty by Capt. Wilkes, was employed by the committee of the Institution to aid in the work upon their collections and in September Mr. W. D. Brackenridge, horticulturist of the expedition, was also taken upon the Museum staff and given charge of the plants,* and a little later Prof. James D. Dana seems to have been given charge of the arrangement of the geological and mineralogical collections, not only of the exploring expedition, but of the Institution cabinet, including the Smithson, Owen, Locke, and Totten collections, and Horatio Hale was performing a similar work upon the ethnographical collections of the Institution, which he reported upon as "chiefly from the exploring expedition."

The force at this time engaged upon the national collections, under the direction of the National Institution, consisted of Dr. Charles Pickering, principal curator, J. P. Couthouy, J. D. Dana, Horatio Hale, and W. D. Brackenridge, curators and assistants, and J. K. Townsend and John Varden, assistants. Thomas Nuttall, the well-known botanist, had in 1841 been engaged upon the herbarium, but had now gone away.

Here, then, in 1842, we find a strong museum force at work on the collections, a force fully as effective thirty years later, in 1873, when the writer first became acquainted with the operations of the Smithsonian Institution.

The report prepared by them at the end of the year 1842 was essentially the second official report upon the national collections, and since it has never been published it is printed in Note B, at the end of this memoir.

At the meeting of September 12 a resolution was passed in these words:

Resolved, That a committee be appointed to wait upon the Secretary of the Navy, and upon the joint committee of the Library of Congress, and to proffer to them the co-operation of the Institute in carrying into effect the intentions of the law lately passed by Congress, for the arrangement and preservation of the collections made by the Exploring Squadron, and for the publication of the results of that expedition; and that this committee be authorized to act in the name and behalf of the Institute in all matters relating to this subject.

In reply to the letter transmitting this resolution, the following letter was received:

NAVY DEPARTMENT, *September 17, 1842.*

SIR: I have received your letter of the 15th instant, transmitting a copy of the resolutions of the National Institute passed on the 12th instant, in relation to the arrangement and preservation of the collections made by the exploring squadron, and informing me that Dr. C. Pickering had been unanimously elected curator of the institute.

*Mr. Brackenridge, on the return of the expedition in 1842, brought the live plants and seeds to Washington, and there being no place for their reception hired a greenhouse and cared for them, apparently on his own responsibility, for several months. Eventually they were provided for at the Botanic Garden about 1859, after having *been for many years* kept in greenhouses in the rear of the Patent Office.

I shall be happy to receive the suggestions of the committee as to the proper course of proceeding.

I am, respectfully, your obedient servant,

A. P. UPSHUR.

GARNETT R. BARRY, Esq.,
Recording Secretary National Institute, Washington.

In the meantime a change in the status of the Government collections had been effected by the passage of an act of Congress, August 26, 1842, providing for the publication, under the supervision of the Joint Library Committee, of an account of the discovery made by the exploring expedition, the third section of which was as follows:

That until other provisions be made by law for the safe keeping and arrangement of such objects of natural history as may be in the possession of Government, the same shall be deposited and arranged in the upper room of the Patent Office, under the care of such persons as may be appointed by the Joint Committee of the Library.

By act of August 4, 1842 (Stat. v., 501), the sum of $20,000 had already been appropriated for the transportation, preservation, and arrangement of these collections.

In the charter of the National Institute, passed a month before, there was a provision that all trusts "are vested and confirmed to the said corporation," and the supporters of the Institute were disposed to urge that this was applicable to the collections of the "exploring squadron" at that time in the custody of the Institution. The question did not come up in a troublesome way at this time, for the Library Committee, at that time unfriendly, simply confirmed the choice of curator made by the National Institute, and appointed Dr. Pickering to the position, Dr. Pickering being thenceforth subject to the Congressional committee, and only by courtesy acting for the National Institute.

Trouble was brewing, however, for it was evident that the links binding together the interests of the National Institute and the exploring expedition were not very tenacious. There was in fact no legal authority for the agency of supervision which the Institution was now exercising, the whole being the outgrowth of a very informal understanding between two or three successive Secretaries of the Navy and a committee of the Institution "appointed to correspond with the Departments of Government."*

This committee, composed of two of the most active directors and the corresponding secretary, soon began to perform the functions of a general executive committee—no doubt with the sanction of the society, but without direct authority.

The recent acts of Congress had taken the control of the collections away from the Navy Department, by whose act alone they had been placed in charge of the Institute. The committee of the Institute still believed itself responsible in an advisory way for the disbursement of the appropriation, but soon found expeditions in progress of which they had no knowledge. The committee filed a protest with Mr. Poinsett, their

*Proceedings 1, 71.

president, who seems to have at once taken steps to secure the only possible relief from the embarrassment that—of special legislation.

The following bill was accordingly introduced in the Senate by the honorable Robert J. Walker:

A BILL for the preservation of the collections of natural curiosities furnished by the Exploring Squadron, and from other sources.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the board of management of the National Institute be, and is hereby, invested with the custody of the specimens of natural history, and other curiosities, which have been received, or which may have been received, or which may hereafter be received, from the Exploring Squadron, and from other sources, with authority to make all necessary arrangements to preserve and exhibit the same, to regulate the number and compensation of persons employed on said duty, and to superintend the disbursements relating thereto.

SEC. 2. *And be it further enacted*, That the said board is hereby authorized to exchange any of the duplicates of said collections, with other institutions, or with State authorties, or with individuals.

At the request of Senator Walker two of the members of the committee had drawn up a statement of the relations which they deemed it desirable to have established between the Institution and the General Government in respect to the national collections. This statement was submitted by Senator Walker, not as an official document emanating from the Institute, but with the heading "Remarks submitted by Mr. Markoe and Col. Abert to the Hon. Mr. Walker." This was certainly an unfortunate form of introduction to Congress, and the opponents of the National Institute made the most of it. The bill with the accompanying statement was referred to the Joint Committee on the Library, and on the 28th of February was made the subject of a report presented by Senator Tappan*, in which he ridiculed the idea of placing the results of a great Government expedition in the hands of a "private corporation," and advised members of the National Institute to disabuse themselves of the idea that regular appropriations would ever be made for its benefit. "The case presents" he remarked "two officers of the Government, one the head of a bureau, the other a clerk in one of the public offices, *who ask as a matter of right* that *they* should have the supervision of a very important literary and scientific work, the publication of which Congress has thought proper to intrust to one of its regular committees." The recommendation of the committee was that the responsibility of this work remain in the hands of the Joint Committee on the Library, where it had originally been placed by law. Senator Tappan's attack was evidently based upon a partial misunderstanding of the views of the members of the National Institute, who simply asked the custody of the collections and the authority to supervise their arrangement. Col. Abert and Mr. Markoe were indignant at the injustice, and addressed to Senator Walker a letter, in further explanation of their views.

This letter, with the comments upon it by Senator Walker and Sena-

* Senate Document, 233, see note to this paper D.

tor Preston, is printed in a note appended to this memoir,* accompanied by a hitherto unpublished letter from Senator Woodbridge, of Michigan, who, as a member of the committee, was able to explain the real significance of its action.

All of these papers are given in a pamphlet† published at the time, which is, however, now exceedingly rare, and almost forgotten.

The versions of the papers here given are for the most part from the originals or verified copies in the archives of the National Museum.

Senator Tappan's speech and the subsequent action of Congress did much to undermine the foundation of the Institute, which was evidently scarcely solid enough to sustain the structure which it had been proposed to rear upon them.

After this it was inevitable that there should arise conflicts of authority, and they were not slow in coming.

It is possible that they were precipitated by Capt. Wilkes, who naturally may have felt some irritation at the manner in which the control of the collections made by his expedition were taken out of his control while he himself was for a time under charges.

The Commissioner of Patents too seems to have been irritated by the occupation of a hall in the Patent Office controlled by alien authority.

In July, 1843, Dr. Pickering resigned his curatorship, and the Library Committee, now hostile, and acting in the spirit of their report, made use of the authority vested in them by the act of August 26, 1842, and appointed to the custodianship of the Government collections the Commissioner of Patents, Mr. Ellsworth, and in August placed Capt. Wilkes in special charge of the gatherings of the exploring expedition.

The action of the committee does not appear to have been known to the officers of the Institute, except by rumor, but they were left to find out the change of policy by an unpleasant series of experiences.

The first serious friction was in connection with Capt. Wilkes. Its character is shown by the following correspondence, which is here printed on account of the new light it throws upon the condition of the National Cabinet of Curiosities in the years 1843–'44 and upon the otherwise inexplicable circumstances which led to the collapse of the National Institute shortly afterwards:

Letter from Col. Abert to Capt. Wilkes, September 5, 1843.

DEAR SIR: Reports of a painful character, involved in the questions of the inclosed letter, have reached the ears of many of us, and I have been urged as chairman of the committee having charge of these matters to bring them before the directors. But I refused, on the ground that I would not be the medium of bringing forward misunderstood or exaggerated facts, for discussion or action, preferring the course of the enclosed letter, as it will procure the desired information from the best authority and under its true aspect. It seems to me that the Institute is the last which should receive unkindness from any one whose fame is

* Note E, I, II, III, IV.

† 1843. [Abert, John J., and Francis Markoe, jr.] Reply | of | Col. Abert and Mr. Markoe | to the | Hon Mr. Tappan, | of the | United States Senate.——Washington,— *Wm. Q. Force, printer.* | *1843.* | *8 vo. pp. 1–18.*

connected with the results of the exploring squadron, for without the interference of the Institute where would these results have been. And without its future care what will become of them, for what other body in whose care they can be placed has a permanent domicile at Washington.

J. J. ABERT.

Capt. WILKES.
SEPT. 5th, (1843.)

Letter from Col. Abert to Capt. Wilkes, September 5, 1843.

SIR: It is contemplated soon to have a meeting of the directors of the National Institute, at which matters of much interest to the Institute will be brought up. Understanding that you have been placed in charge of the room in which both Institute and ex. expedition curiosities are deposited, and anxious that at our meeting the directors should be fully and correctly informed, allow us to beg of you the favor of an early answer to the following queries:

1. Have directions been given to remove the property of the Institute and that under its care, except exploring expedition specimens, from the room in which they now are or from the cases in which they have been deposited, or are such directions contemplated?
2. Are the persons employed at the room and paid by the U. S. prohibited from bestowing any attention upon any other than ex. exp. specimens, from opening the boxes of presents sent to the Institute, cleaning, arranging, and attending to the same?
3. Will any of the persons employed at the room and paid by the U. S. be allowed to bestow any of their time and talents upon the preservation and arrangement of the collections, except those of the ex. squadron?
4. Can the Institute count with sufficient certainty upon the services of any person so employed so as to invest him or them as curators or assistants with the requisite authority from the Institute?

You will readily perceive the importance of these questions to the Institute, and how eminently they invoke the security and preservation of the valuable and extensive collection under its care, you will, therefore, I hope, pardon us in the request of an early answer.

J. J. ABERT.

Capt. CHARLES WILKES,
U. S. Navy, Washington.
SEPT. 5, 1843.

Letter from Capt. Wilkes to Col. Abert, September 16, 1843.

WASHINGTON CITY, 16 *Sept., 1843.*

MY DEAR SIR: Your friendly letter was received on my return to the city after a short absence, which will account for your not having an earlier reply.

I can not acknowledge any right in a committee of the Nat. Inst. to call upon me for any explanation whatever relative to my official duties or actions, particularly when such a call is based upon (as you inform me) painful reports of which I have no knowledge and little regard, and can not help expressing my astonishment that any members of a scien-

tific society should have given credence to them, to have authorized an action on the part of one of their committees before they had ascertained that they were true.

I cannot but admire your course in refusing to act, or to the wisdom of bringing them forward for discussion or action before an appeal was made to the best authority. I therefore feel much pleasure in answering the questions as coming from yourself, and do it particularly with a view that you may communicate it to any of the gentlemen, your associates, who may have been instrumental in getting up and giving currency to the reports which you inform me are in circulation.

1st. The law places the collection of the United States exploring expedition in the upper hall of the Patent Office building and under the care of the Joint Library Committee of Congress for the purpose of arranging the whole for description, publication, and exhibition. The Library Com'ee have appointed me to superintend them to this end. In pursuance of my duties the whole is undergoing arrangement. When I took charge on the 1st of August a few specimens and articles were pointed out to me as belonging to the Nat. Inst.; those have not been disturbed further than became necessary in the arrangements, and an equal care has been bestowed upon them that others have received.

2d. All the persons employed and paid by the Government are required to devote themselves entirely to the Government work; when there is no longer employment for them, or they do not give satisfaction, they will be discharged. It is believed that their time is now fully employed, and that their duties require all their attention and talents to be devoted to the collection of the expedition in order to perform them to the satisfaction of the Library Committee and myself. They are under the same system as if employed elsewhere by the Government. From this it follows that their time and services for which the Gov't pays can not be devoted to or divided with any incorporated association.

Although believing that the above embraces an answer to all the enquiries made of me I will go further and assure you that there is every disposition on the part of the Library Com'ee of Congress and myself to have things belonging to the Nat. Inst. that are now in the hall taken care of, and due notice will be given to the Institute should the little room they occupy be required for collection of the exp'g expd., which it is now confidently believed will entirely fill the hall when they are fully arranged. I will now close with a few words respecting the last clause of your letter relative to my feeling any "unkindness" towards the Nat. Inst. It is rather improbable that any unkindness or hostility would exist on my part considering that the labour of the expedition, combined with the exertion of your gifted president (Mr. Poinsett), were the origin of it, and that in all probability it may one day become the depository of the large and valuable collection of the exp'g expedition, therefore I can not but feel deeply interested in its welfare—everything compatible with the performance of my public duties will always be done to accommodate and assist its rise and progress.

Believe me, with great respect, your obt. svt.,

CHARLES WILKES.

Col. J. J. ABERT,
N. I. Corp. Top. Engrs., Washg.

Letter from Col. Abert to Capt. Wilkes, September, 1843.

DEAR SIR: Your letter has been duly received. As well for our own justification and for your satisfaction, I will go into some length in a reply.

Abstractly speaking there may be no right in the Institute to enquire into the course of your official action, but if under any circumstances this action be hazardous to the property of the Institute, or to that deposited and placed under its care, there can be no doubt, I think, that the Institute has a right to enquire if such be the case and why.

You can, if you choose, give us a very short reply—that what you have done was in the execution of your official duties for which you can account only to your official superiors. Yet, nevertheless, the Institute would have the right to make the enquiry and to expect an answer of some kind. But allow me to call your attention to the reflection that it is in your civil relation of an agent of the Library Committee, in which you are now temporarily acting; and it is only in that capacity that any accountability can attach to you, or that any was supposed by the committee of the Institute to exist.

As an officer of the Navy you can not now be acting; your course is not by virtue of your commission or rank in the Navy, or orders from your constitutional or legal superiors, or of any duties connected with your profession. No official responsibility can exist between Capt. Wilkes, of the Navy, and the Library Committee; or official penalties be incurred by a neglect of its directions. Your position, if I understand it correctly, is by virtue of the authority in the Library Committee, to place the collection under the care of such persons as they may appoint. The executive or the constitutional session of the Army, as well as Navy and War, etc., to assign you to a ship to-morrow, you would have to go and abandon the care assigned to you by the Library Committee, which shows, I think, that it is not the official relations of the offices which are involved in your present position. Dr. King once had the place, then Dr. Pickering, to whom you succeeded—both of these gentlemen were civilians, and as you succeeded them in your present place, it is clear, I think, that it is not in any official relation which Capt. Wilkes can claim, or to which he can be assigned, that he is now acting, but in the civil relation of a person appointed by the Joint Library Committee to take charge of matters the publication of which has been made a duty of that committee. I make these explanations of our views, that you may feel relieved from the supposition that we had the most remote idea of encroaching upon your official rights, for which I assure you, as well as for your well established professional abilities, we all entertain the greatest respect.

The specimens of the exploring squadron are to be deposited and arranged in the upper room of the Patent Office. This, however, does not, we think, give the exclusive possession of that room for that purpose, unless such exclusive possession be necessary. Whether it be or not I am willing to admit is the right of the Library Committee to decide, and if they so decide others must give way. The sign lately put over the door would seem to indicate that such decision was in contemplation. The Institute has also possession of part of that room of the eastern half by direction of the Secretary of State, under whose care the whole building was then placed. The Institute has property there of great amount, and in our judgment of great value, and if it has to move its property, by virtue of a decision by the Library Committee, the courtesy of notice from the agent of that committee is not, I think,

too much to expect, and our right to enquire, if we shall have to move, should be viewed as a duty on our part as the curator of so much property. I assure you the enquiry was made with these impressions only, your assurance that notice will be given, if we should have to move, leaves us satisfied in this respect.

All that belongs to the exploring squadron is under the care of the Library Committee or its agent. But the Institute is a legal body, regularly chartered with defined right over its property, gifts, and deposits. (See Law of 27 July, 1842.) Now, what is this property? Gifts and deposits from members from foreign governments, from distinguished foreigners, from our diplomatic agents, from foreign societies, from domestic societies, from departments of our own Government, from our own citizens. In a word, all the property in the room, except that of the exploring squadron and that of the Patent Office, which (Institute) property, unless I am very much mistaken, far exceeds the impression you have of it, and judging from some remark about the few things of the Institute.

Now, this property requires care, watching, and cleaning.

I have at this time in my office twenty-four cases of the most valuable specimens sent from Asia and Mexico to the Institute which we have not sent up, because we were informed they would probably not be received, and would certainly not be allowed to be opened and exhibited, as some 60 boxes or more of Institute specimens are now in the room unopened and unattended to. Surely it was proper that such matters should be enquired into if only for the future government of the course of the Institute. We can not be without anxiety for our valuable collection nor unmindful of our obligations to preserve it.

I feel satisfied you will see with me only matter of lamentation in such a state of things. Science and national pride must bitterly regret any seeming necessity for it.

All the labor, all the contributions, from whatever branch of service, civil, diplomatic, navy, military, are for the scientific reputation of our common country, and a hearty union of all is necessary to form a good collection. Deprive it of the charm of being national, deprive it of that halo of interest with which the name national has already covered it, and it will soon cease to increase, will be no longer worthy of a thought, and will rapidly degenerate to the insignificance of a local collection.

Such are at least my views, and such were also the views which brought the National Institute into existence, when about eight of us had our first meetings at Mr. Poinsett's. We then digested a scheme in which we thought all persons could unite, because it was national; which all parties could befriend, because it was national; to which all conditions and branches of service could contribute, because it was national; to which the Government might extend its patronizing hand, because it was national, because it aided and elevated the national character, and because it would furnish a broad platform of national feeling upon which all parties, all sects, all conditions of life could, on principles cherished by all, meet and unite in erecting a temple to national fame. And how charmingly have we gone on; look at our great accumulations for so short a time, and yet it is all but a good beginning; look at the feeling which exists throughout our country and throughout the world in our favor evidenced by contributions and letters from all quarters, and then ask the question whether to aid or to embarrass a design so glorious and so free from objections will give the most individual fame?

But we must know our condition, and what we have to depend upon. It is essential that we should, and you, as the agent of the Library Committee, are the only person from whom we can obtain the desired information. Therefore, of necessity, we had to address ourselves to you, and if I understand your answer correctly it is: That you do not consider yourself at liberty to allow any of the persons receiving pay from the United States to give any of their time or attention to the affairs of the Institute, to overhaul or arrange or look after its specimens.

Both of your predecessors, Dr. King and Dr. Pickering, were also, with the approbation of the executive, curators of the Institute, and gave some attention to its affairs. We did not, of course, expect that you would take a similar trouble upon yourself, and one question in my previous letter was to ascertain if you would allow any of those under you to attend to the Institute collection and property. I understand you also as thinking this beyond your power. Under these circumstances the Institute must act, and promptly, or its valuable collection will be injured. The board of management will soon meet and the matter will be brought before them.

If in anything I have misunderstood you, I beg that you will not delay to correct me, for be assured that I have no desire to put anyone in the wrong, and least of all the eminent commander of the exploring expedition.

J. J. A.

Soon afterwards a more serious conflict of authority began—this time with the Commissioner of Patents, who was actually the official guardian, not only of a portion of the collections, but of the hall in which the entire cabinets, both of the society and the Government, were lodged.

The correspondence referred to in Mr. Ellsworth's first letter evidently related to the great mass of native copper of the Ontonagon (still a prominent feature in the National Museum), which the Secretary of War had placed in the custody of the Institute at its meeting in October previous. Mr. Ellsworth was evidently bent upon dislodging the National Institute from the Patent Office. To effect this he pursued the not altogether ingenuous course of belittling the Institute, its work, and the extent of its cabinet, and laying claim to the official possession of more important collections of models, fabrics, manufactures, which, in accordance with the act of 1836, reorganizing the Patent Office, he designates as the "National Gallery," a name which he also applied to the great hall in which all the collections were deposited.

The Commissioner of Patents was evidently legally in the right, and the Institute found itself bereft not only of its command of Government collections, but also of its hall.

The correspondence is here printed.

Letter from the Commissioner of Patents to the Secretary of War. December 7, 1843.

PATENT OFFICE,
Washington, December 7th, 1843.

SIR: I have the honor to acknowledge the receipt of a letter from the Secretary of War of the 2d inst., communicating the information that my letter to his Department of 1st inst. had been referred to a committee of the National Institute for answer.

Permit me to enclose a copy of the correspondence with said committee. I have ventured to say in my reply that I did not believe their letter to myself had met your approval.

The Hon. Sect. will imagine my surprise at the letter of the committee when he is informed that the Commissioner of Patents has the custody of the Patent Office building; that he holds a special appointment under the Joint Committee of the Library to take charge of all the property of Government mentioned in the act of August 26, 1842, and more especially as the National Institute has omitted to appoint a curator to protect the other articles received from the War and Navy Departments, or even their own effects in this building since July last, and hence the care has devolved upon myself as an act of courtesy if not of duty.

Under these circumstances, and having interested myself in the exhibition of the copper rock at the seat of Government, I offered to take charge of it, under the direction of the Secretary of War, if he desired it.

The disappointment expressed by many members of Congress at not finding this beautiful specimen in the National Gallery prompted me, at the date of my letter, to make, as I hoped, a respectful offer to the Hon. Secretary of my services. Nor would I have replied to the committee had I not supposed that silence might seem to admit that I had been guilty of great presumption.

Let me add that I am a member of the Institute and cherish its welfare.

I remain, with highest respect, your's, obediently,

H. L. ELLSWORTH.

Hon. J. M. PORTER,
Secy. of War.

Letter from Col. Abert to the Commissioner of Patents, December 5, 1843.

WASHINGTON, *Dec. 5, 1843.*

SIR: The honorable Secretary of War has referred to the committee of the National Institute your letter of the 1st inst.

Being uninformed by any law or regulation of the existence of a "National Gallery" or of any other collection under your care than the models of the Patent Office, you will pardon me if I do not fully appreciate the views or reasoning of your letter.

At one period, by order of the Executive, the upper room of the Patent Office was made the place of deposit for the effects of the "National Institute," a society known to our laws and regularly chartered by Congress. This room thus became the hall of the Institute. In this room the Institute had deposited the collections from the exploring squadron, and those from all other sources which were placed under its care by order of the Executive. But from a supposed necessity, Congress vested the care of the deposit from the exploring squadron

for the purpose of preparing an account of it, in such person as the Joint Library Committee should appoint. This committee appointed Capt. Wilkes, of the Navy, for that purpose, who is now exercising the functions of his office, and who may with propriety be considered as in the regular official possession of the room.

In all this one sees nothing of the Patent Office or of the "National Gallery" or of any charge direct or indirect of the Patent Office over the deposits referred to. If therefore by "National Gallery" is intended to designate the room in which are now placed the deposits of the Institute and of the exploring squadron, it is not a room over which the head of the Patent Office can exercise control.

By a law of the 20th July, 1840, the Secretaries of the War and Navy Departments were placed in charge of the specimens of natural history, received and to be received by them, and funds were appropriated for their preservation. The officers have deposited such articles as were then in their possession, and such have since been received in the care of the National Institute, as that law and the practice under it are considered as prescribing the course on these subjects, and in the 2d section of the law of July 27, 1842, all these deposits and the principle upon which they were made were confirmed and legalized. When therefore the copper work arrived, to which your letter refers, the honorable Secretary of War, in conformity of law and usage, placed it under the care of the National Institute.

As it was understood to be rather an inconvenience to Capt. Wilkes from the want of space to receive any more articles of the Institute in the hall under his care, and as the Institute has at present no curator there, those boxes and articles which have come to hand within the last few months have been temporarily deposited elsewhere, and among others the copper rock. The committee of the Institute which received this rock had it deposited in the War Office yard, where it is accessible without impediment to all who are disposed to examine it, and where it is under the efficient protection of the guard of the War and Navy Department buildings.

Very respectfully, your obt. svt.,

J. J. ABERT,
Ch. Com. Nat. Inst.

H. L. ELLSWORTH, Esqr.,
Commr. of Patents, Washington.

Letter from the Commissioner of Patents to Col. Abert, December 7, 1843.

PATENT OFFICE, *December 7, 1843.*

SIR: I have to acknowledge the receipt of yours of the 5th inst.

The Honorable Secretary of War has, it seems, referred to the Chairman of the Committee of the National Institute the answer of my letter to his Department, offering to receive for exhibition at the National Gallery the "Copper rock".

I can not withhold my surprise or the expression of my regret that the Committee of the Institute on the reference of my letter deemed it necessary to declare their unwillingness to recognize any such place as the "National Gallery" under my care and to question the right of the Commissioner of Patents to the use of the large Hall in the Patent Office building, and still more at *their* claim of right to use that Hall when their accommodations were only enjoyed at the *convenience* of the

Commissioner of Patents. To this unexpected reply to my letter I can not believe the Hon. Secretary of War has given his approval.

Permit me to refer the Committee to the Act of July, '36, reorganizing the Patent Office. The first section gives the Commissioner of Patents the care of the models of Patents, records, books, &c., &c.

The 20th section establishes a "National Gallery," in which the Commissioner of Patents is bound to exhibit not only models but fabrics, manufactures, &c.

To carry out the design of this law cases have been erected at great expense and many articles collected, while additions are daily made.

It is true that the National Institute did seek to obtain the entire control of the large room in the Patent Office. A refusal was given because the Patent Office building was by law placed under the care of the Commissioner of Patents and because the room was needed, at least in part, by the office.

The law of August 26th, '42, to which you refer, simply enacts:

"That until other provisions be made by law for the safe keeping and arrangement of such objects of natural history as may be in possession of Government, the same shall be deposited and arranged in the upper room of the Patent Office under the care of such person as may be appointed by the Joint Committee of the Library." The act evidently did not contemplate the exclusive control of the room, but a supervision of the articles entrusted to the care of said Library Committee.

This Committee on advisement with the War and Navy Department appointed Dr. C. Pickering, who enjoyed the use of the Hall in common with the Patent Office in a manner I had supposed entirely satisfactory to all concerned.

To relieve this Bureau from care and responsibility I propose to the Hon. Secretary of State to transfer to Dr. Pickering the custody of the archives, jewels, etc., received from the Department, but the Secretary declined, observing the Commissioner of Patents was a branch of the State Department, and he could not consent to place the articles confided to him under care of a corporation or a stranger over whom he had no control.

In July last Dr. Pickering resigned his trust. The Joint Committee of the Library, upon whom alone devolved the right of filling the vacancy, entirely unexpected to myself, conferred the appointment on the Commissioner of Patents. Of course the Commissioner of Patents has now by law the custody of the large Hall, which in all official correspondence has been called the "National Gallery."

I will remark that the Hon. Secretary of State expressed a wish in the letter giving directions as to the large hall that the National Institute might be permitted to occupy any "empty cases" so long as this could be done without inconvenience to the Patent Office. In this request I most heartily acquiesced, and have permitted the Institute to enjoy from time to time a very considerable portion of the upper and lower stories. And while the Commissioner of Patents has the sole custody of the building the Institute may be assured that the articles deposited by them will receive the same care and watchfulness as those belonging to the Patent Office or those received from the Government.

It has given me pleasure to try to accommodate all parties, hoping that Congress would make further provisions as appeared to be necessary. The time has now arrived when the wants of the Patent Office imperiously require more of the large hall, and it remains for the National Legislature to determine who shall be accommodated when there is not room for all.

I regret your correspondence has compelled me to say thus much in defense of the position I have the honor to hold.

Yours, respectfully,

H. L. ELLSWORTH.

Col. J. J. ABERT,
Chn. Com. Nat. Inst.

Still another blow was in reserve. Statements were made in public to the effect that the collections of the Institute were of very trifling value, and one which appears to have been printed, though I can gain no information as to its nature, made certain charges in connection with the portraits in the possession of the Institute, intended to show that the Institute was "unworthy of the patronage of the Government."

This happened apparently during the great meeting of the friends of the Institute in April, 1844, evidently with the intention of counteracting any effect which the assemblage might produce upon Congress.

Mr. George P. Marsh, M. C., at this time (April 4) addressed a letter to the corresponding secretary of the Institute stating that its memorial had been referred to him as a member of the Library Committee of Congress, and asking for information to enable him to meet objections made by persons unfriendly to the Institution. The information given in the following letter in fact constitutes a third report upon the national collection, a little more than a year subsequent to the date of those already quoted:

Letter from Messrs Markoe and Abert to the Hon. George P. Marsh, April 8, 1844.

WASH'N, *8 April, 1844.*

To Mr. MARSH, H. R.

DEAR SIR: Your letter of the 4 inst. has been received. It found me occupied by numerous & pressing engagements, and left so short a space of time for reply that I have been compelled to call for aid upon a friend, Col. Abert, with whom I was for a long time associated a member of an important committee of the Institute, whose business it was to understand its affairs.

It is to be deplored that there are persons so unfriendly to the Institute, as to state "that its collections are of very trifling extent and value, and that for this and other reasons not necessary now to be specified, the Institute is unworthy the patronage of the Government." Some consolation, however, is derived from the assurance, that you do not entertain these opinions, and from the opportunity which is now offered of correcting at least one of these erroneous opinions the only one that has been presented with sufficient distinctness to be met, namely, that which refers to the extent and value of the Institute's collections We should have rejoiced if "the other reasons" had been as candid specifically and, so we seize this occasion to assure you of our readiness, our anxious desire, to meet any unfounded report or misrepresentation which may have led to the assertion, that the Institute is unworthy the patronage of the Government. We are the more anxious as the assertion seems to have grown out of other considerations than the supposed trifling extent and value of the collections of the Institute.

The property of the Institute is of two kinds: That which it owns, the result of donations & purchases, and that which it holds by Deposit. The latter kind, by our Charter cannot be withdrawn, even by depositors, till after due notice has been given. The statement which follows, made by Col. Abert, & wh. embraces a very indequate description of the report, embraces gifts, purchases & deposits is taken from the records of the Institute, and it may be verified at any time by reference to the records, an attentive examination of wh. would show that the property of the Institute is of immense value, & of great American as well as general interest; & that it is increasing every day in a wonderful manner—a perusal of the two Bulletins of the proceedings of the Institute wh. have been published will give you the details for two years of these accumulated & accumulating materials, & the unpublished Records wh. go back for two years will supply the rest—Mr. Markoe begs leave to add that the MS. matter wh. accompanied the memorial to Congress, & wh. has happily been placed in your hands, embraces a very condensed view, wh. he prepared with great care & toil of all the contributions, donations & deposits which have been made to the Inst. since its foundation in May 1840, up to March 1844, & of the names of the contributors, donors, & depositors. For a refutation of such misstatements we refer you to these exact details, & sincerely hope that Congress, will publish for its own information as well as for the information of the world & as an act of justice to the Institute

The collections referred to are in the great hall of the Patent office, at the Treasury, War & State Depts., at Col. Abert's office & at the house of the Secretary of the Inst. Besides wh. letters have lately been rec'd. announcing the approach of great quantities of boxes of specimens of natural history, & other miscellaneous presents, from For. Govts. Ministers & Consuls of the U. S. from officers of the Army & Navy, & from many Societies & individuals both at home & abroad.

In conclusion, while we invite scrutiny in any shape, we take the liberty of suggesting our earnest & anxious wish to meet a committee wh. whenever appointed will find or prepare to explain the character & merits of the Inst. & effectually to defeat unfounded & irresponsible surmises.

With true regards, Yr. obt. humble svts

FRANCIS MARKOE.
J. J. ABERT.

Imperfect & hasty statement of the collections & specimens, being either the absolute property of the Institute, or specially deposited under its care. It is believed, that the greater part of these, will eventually become the property of the Institute; many of them having already become so.

Minerals—1st. About 6000 miscellaneous specimens from all quarters; 2d. A complete collection of about 10,000 specimens; 3d. In addition there are about 190 boxes or collections, not examined or opened. They are spoken of as "boxes" or "collections," because the donors used these terms in their letters presenting them and they are accordingly so entered upon the Journals of the Institute. 4th. There are also 4 boxes of splendid minerals of Mexico, presented by His Exc. Mr. Tonsel the Minister of War & Marine of Mexico, and one box Mex. Antiquities.

Fossils.—Upwards of 30 boxes and seven or 8 thousand miscellaneous specimens & casts of rare fossils.

Birds.—1st, 1368 separate specimens; 2d. nine large boxes, one of which contains 27 dozen skins of rare birds from Brazil.

Quadrupeds.—Between 4 and 500 specimens. Insects 74100 specimens, and more than a dozen boxes besides not opened. Most of these in a deplorable condition for want of funds to preserve & arrange them.

Shells.—1638 specimens, & more than 20 boxes and one barrel.

An immense number of fishes, reptiles mollusca, et cetera. One donor, Lt. Gedney, U. S. N. gave upwards of 600 specimens & a large & rare collection of reptiles, fishes &c. which composed a part of the munificent gift of Prince Momfanio, of Spain.

Coins, medals & medallions, antique & modern, embracing very many extremely rare & valuable series gold, silver & copper &c. 1st. 573 specimens; 2d. seven boxes.

Maps and atlasses in great numbers; books & pamphlets, between 4 & 5000, many very rare, sent by the Russian, French, Belgian, Brazilian & other governments, & from Societies in various countries. About 1000 engravings, many extremely choice, by the first Artists in the world, and several large boxes & engravings not opened.

Specimens of woods, marbles, domestic manufactures, fossil teeth, megatherium bones, Ancient vases & vessels, electrotype pictures, mosaics, Egyptian & South Sea idols, large collections of human quadruped & bird crania, antique masks, rare collection of Indian dresses &c., daguerreotype pictures, corals & coralines, large collection of dried plants from all parts of the world. Specimens of art implements & an infinite diversity of contributions of every description too complicated & various to enumerate.

The Columbia Institute's collection consisting of a large number of books, works of art, specimens of Nat. Hist., all which are now the property of the Nat. Institute. Models of monuments, & of works of art etc. etc. Several hundred Indian Portraits, and other paintings, many very rare & valuable & some the production of the best masters.

Skeletons, Antlers, Horns, Teeth, Bones & casts of various quadrupeds & other animals.

Indian Musical & other Instruments & implements & Lithographic portraits & drawings in great numbers.

Large collection of objects of Natural History, idols, fabrics, antique work of art &c. from Egypt and Africa, many of great curiosity & rarity, from various persons, &c.

Collection of Statuary, busts & casts.

Large collection of tribolites & rare fossils

Dr. Franklin's printing press.

A collection of Bedowne war instruments, & a variety of oriental curiosities.

A series of fine Electrotype medals, embracing the British & French Sovereigns, from William the Conqueror to Victoria, and from Pharamond to Louis Philippe.

It is scarcely possible, in reply to your note wh. calls for an immediate answer to enumerate further, but we don't depend on so scant a list, given in terms necessarily somewhat vague. We call special attention to the minute & exact detail given in the abstract of the proceedings of the Inst. prepared by Mr. Markoe, & wh. accompanies the memorial to Congress, where every thing will be found exhibited & described. We believe that if the collections of the Inst. are not already as great in value as those brought home by the Exploring Expedition, they will become far more so in a very short time. In *American interest* the Institute's collections far transcend the other.

In answer, apparently to a subsequent inquiry from Mr. Marsh, as to the amount of the subsidy desired by the Institute, the following schedule seems to have been prepared. There is nothing, however, to indicate that it was ever submitted to Congress. It is of interest as showing the state of expenditures contemplated for the National Museum nearly half a century ago:

[Memorandum in Col. Abert's hand.]

DEAR SIR: In answer to your inquiry of this morning as to the probable amount and the division of it which will be requisite to preserve and arrange the various articles of natural history belonging to the National Institute, I have the honor to submit the following views to your consideration:

One taxidermist, who should also be a scientific ornithologist and well versed in natural history generally, per year	$1,400
One assistant	600
One entomologist, who should also be capable of arranging and naming the reptilia	1,200
One assistant	600
One mineralogist	1,000
One assistant	500
One person in special charge of the articles, to watch over them, exhibit them, etc., who should also be a mechanic	600
Two laborers—these should be men of some ability in using tools, $1 per day for each	730
Tools, implements, preserving liquors and ingredients, apparatus cases, and other fixtures	2,500
Freight, postage, stationery, and other contingencies	1,200
Arrearages due for freight, postage, printing, etc	1,500
	11,830

Hon. Mr. MARSH, May 18, 1844,
House of Representatives.

Notwithstanding the extraordinary efforts at this time made and the favorable report of Senator Choate, Congress adjourned in the spring of 1844 without making any provision for the care of the collections of the Institute.

Another effort was made in 1845. Senator Levi Woodbury, president of the Institute, in the annual address delivered by him on January 15 in the Hall of the House of Representatives, made a most impressive appeal to Congress. After urging prompt action in the matter of the Smithson trust—"a trust so sacred and imperative that a longer delay to execute it might prove not a little derogatory to our national honor"—he continued:

Should the plan for this not be speedily matured, including the use of the Institute or its officers, then a grant at once of enough to defray the expenses attendant on the good preservation and collection of the public materials in our charge seems indispensable, and is believed also to be free from every doubt connected either with expediency or the Constitution, as many of the collections now belong to the Government and all of them are vested in it when the charter expires, and may be forthwith if desirable. What small sum then is granted for this object by the Government is granted for taking care of its own property, the title of which is public, the one public, the whole end and aim public; and that act of duty done, we hope, by the further help of

our own contributions, with those of liberal friends of science elsewhere, by the continued and generous assistance of the officers of the Army and Navy, of our foreign ministers and consuls, as well as the members of Congress and many in private life, I think it may be safely said we hope to advance still further and faster, till we render the Institute in many respects worthy its unrivaled position and the growing country to which it belongs.*

This was followed up by a memorial to Congress, which, having never before been published, is here presented,† and which was favorably acted upon by the Library Committee, who adopted the report submitted by Senator Choate concerning the similar memorial of 1844. No action was, however, taken.

Still another appeal was made‡ to the Twenty-ninth Congress, which was presented to the Senate by Lewis Cass, and to the House of Representatives by John Quincy Adams. This, too, was fruitless.

In 1846 also, as we have seen, Mr. Ingersoll, always a faithful friend of the Society, endeavored to establish a connection between it and the Smithsonian Institution in the administration of a National Museum, but the effort failed at the last moment, and the Regents of the Institution were not inclined to take advantage of the privilege of putting this building as a wing to the Patent Office, as they might have done.

In the organization of the Smithsonian Institution the National Institute was practically left out of account, and the hopes of many years were blasted. What was still more discouraging was that power had been given to the new corporation to take possession of all Government collections in the custody of the Institute, on the possession of which its chief claim to a subsidy was founded, and in connection with which a considerable debt had been contracted,§ as is indicated by Mr. Rush's letter of July, 1846.

In the "Notice to the Members of the National Institute" which served as an introduction to its fourth Bulletin, dated November 25, 1846, a pitiful statement of the condition of the society is given:

More than a thousand boxes, trunks, etc., embracing collections of value, variety, and rarity in literature, the arts, and in natural history, remain on hand unopened—the liberal contributions of members at home and abroad—of governments, of learned and scientific societies and institutions of foreign countries and of our own, and of munificent friends and patrons in every part of the world. For the preservation, reception, and display of these the Institute has neither funds nor a suitable depository.‖

This was a fatal condition of affairs, for the formation of a museum was the one object which, out of the many specified, seemed to have

* Annual address, pp. 33, 34.

† Note F.

‡ Note G.

§ Col. Abert estimated the amount in 1844 at $1,500 and it was now doubtless greater.

‖ Proceedings I, p. 481. (Fourth Bulletin.)

finally absorbed the energies and the limited income of the National Institute.

It had evidently been the belief of its chief promoters that if a museum under the patronage of the Government and under the control of their society could be firmly established in Washington, all the other ends sought by them would follow in necessary sequence.

In accordance with this policy circulars had been sent out to the officers of the Army at distant ports asking their aid and pointing out the manner in which they might be useful in carrying out the objects of the Institution, "and others to the governors of States and to the diplomatic and consular representatives of the United States in foreign countries, announcing that they had been made corresponding members, and inviting their aid in the promotion of the objects of the Institution," and to each member of Congress, with a request that he bring specimens of the natural productions of his district on his return to Washington.*

WASHINGTON, *February 9, 1841.*

SIR: The National Institution for the Promotion of Science and the Useful Arts, established at the seat of government, is desirous of procuring specimens of the natural productions of every portion of the United States, and for that purpose respectfully asks your aid and coöperation. The district you represent doubtless possesses many important minerals and vegetable productions, which might prove of great value to the arts if they were generally made known. Specimens of such productions being brought to Washington will not only advance the objects of the institution, but will prove advantageous to the country whence they come. They will be described by the scientific members of the institution, and their uses and advantages pointed out, and the specimens exhibited to the public in its museum.

You are respectfully requested to bring with you, on your return, such specimens as you may collect during the ensuing recess. Even a single specimen from each member will be of great advantage to the Institution, and be thankfully received as a tribute to science.

We have the honor to be, sir, your most obedient servants,

J. R. POINSETT,
J. K. PAULDING,
Directors.

To the Hon. ———.

The assumption by a society of the important duty of organizing and conducting a national museum would seem at the present time somewhat strange, but it should be remembered that from the beginning it was announced that all the collections made were the property of the General Government, and that in the incorporation of the society by Congress all the property of the corporation at the time of the expiration of its charter, limited to twenty years, should belong to and devolve upon the United States. Still more important a factor in the influence of the society was the character of its membership, which included most of the leading men in political, scientific, and literary circles, and had upon its list of officers and directors such names as that of John Tyler, President of the United States, and his Cabinet, an ex-

[* Circular letter to members of Congress.]

Secretary of War, two leading Senators, Levi Woodbury, Peter Force, Col. J. J. Abert, Col. J. R. Totten, and Lieut. M. F. Maury, Rufus Choate, Abbott Lawrence, and A. D. Bache. Our Government functions were less centralized at that time, and the policy of allowing more scope to private effort in public matters was similar in this instance at least to that which prevails in Great Britain at the present time. It was not to have been expected, however, that its authority should have remained long unquestioned, and in the end its lot was that which very frequently befalls those who out of disinterestedness undertake, unasked, to forward the interest of others. Thus, as Rush aptly put it, the merit of the Institute was turned to its misfortune, and its "voluntary zeal" was thought totally unworthy of recognition.

The various invitations to members of Congress, army and Navy officers, consuls and citizens to collect and send in materials had, however, begun to bring in great quantities of material, and the inability to care for these properly was the cause of the appeals for Government aid which as time went on grew more frequent and urgent till 1846, when discouragement took the place of anticipation, and the society fell into a condition of inactivity and apathy.

The real cause of the decline of the National Institute was simple enough. Failing to secure grants of money from Congress, the society was overwhelmed by the deluge of museum materials, which in response to its enthusiastic and widely circulated appeals came to it from all quarters of the world. The annual receipts from the assessment of members were insufficient to pay for the care of the collections, and although by virtue of the long term of its charter the collections were kept together until 1861, there was little science and little energy manifested in this administration.

In the archives of the National Museum there are a number of unpublished papers which are of value as constituting a partial history of the collections during this period, and some of which appear to be worthy of permanent preservation are here presented.

One of them possesses a melancholy interest of its own. It is a list of the active members of the National Institute in arrears for dues up to December 12, 1843. The delinquents were one hundred and sixty-eight in number, including nearly one-half of the names on the membership roll, and the total arrearage amounted to $1,300. No wonder that the managers were discouraged, for this sum represented a like deficit in the assets of the society, its only income being derived from membership fees.

From this time on, as we have already seen, the society languished. In 1848 its cabinet was almost the only evidence of its existence. At that time, however, an effort was made to resuscitate it, which seems to have been partially successful. The coming in of a new administration was in some degree beneficial—the President, Taylor, having

accepted the position of patron of the society, and some members of the Cabinet proving to be friendly.

About this time the society seems to have regained its control of the hall in the Patent Office, an apartment which now came to be known properly as "The National Institute"—a name which it retained until the hall was finally dismantled.

A visitor to Washington at the time of the inauguration of Taylor, in 1849, has left a record of his impressions of the capital city—at that time still very crude and unfinished. "All that meets the gaze in Washington, except the Capitol and the Departments, seems temporary," he wrote. "The city appears like the site of an encampment, as if it were more adapted for a bivouack than a home." And then he goes on to describe some of the principal characteristics of the city:

In the National Institution, like nearly all of our scientific and literary establishments, as yet in embryo, sea-quadrupeds from the Arctic zone, birds of rare plumage, the coat in which Jackson fought at New Orleans, the rifle of an Indian chief, plants, fossils, shells and corals, mummies, trophies, busts, and relics, typify inadequately natural science and bold adventure. * * * The foundation of the long delayed monument to him of whom it has been so admirably said that "Providence made him childless that his country might call him father," the slowly-rising walls of the Smithsonian Institution, the vacant panels of the rotunda, the sculptured deformities on the eastern front of the Capitol, and the very coin, freshly minted from California gold, awaken that painful sense of the incomplete, or that almost perplexing consciousness of the new, the progressive, and the unattained which is peculiar to our country.*

President Taylor placed in the custody of the Institute the Washington relics, and some other hopeful things occurred. The members, gained courage and proceeded to revise its constitution and by-laws to vote to print a quarto volume annually, to be entitled "The Transactions of the National Institute,"† and to memorialize Congress for financial aid, and to offer its services to the Government "as a referee in matters which involve scientific knowledge and investigation."

In 1850, at the request of the Secretary of State, the Institute undertook the appointment of the "Central Authority," a committee of twenty-one members to pass upon articles proposed to be sent to the World's Fair of 1851 in London.

The needs of the Institute in 1850, as summed up in the Secretary's report, were not extravagant—a medium of publication, a curator and librarian, who were to be paid sufficient salaries to enable them to give a considerable portion of their time to the work, new bindings for the books, and more room for library and meetings.‡

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*1849. Tuckerman, H. T. The Inauguration. < *The Southern Literary Messenger*, xv, pp. 236-40. Richmond, April, 1849.

†This series was never begun.

‡None of these, however, were *realized*, save for a short time the publication of *Proceedings in octavo in 1855-'57.*

At this time there were twenty-seven paying members of the society, and its income was less than $150 yearly.*

Mr. C. F. Stansbury, the Secretary of the Institute, acted as its agent for the World's Fair, and obtained there some specimens for its museum, and in 1850 others were received from the New York Exhibition.

It would appear from the records of this time that there was still a "Gallery of Curiosities" in the Patent Office not in the custody of the National Institute.†

In 1854 the Commissioner of Patents, for many years vested with a measure of authority by the Library Committee, was given by Congress‡ the administration of the collections and authorized to employ keepers, and a trifling appropriation was made to be expended under the Department of the Interior—an arrangement which continued for three subsequent years.

In 1857, the Smithsonian Institution having definitely accepted the responsibility of caring for the national collections, all the articles deposited with the National Institute were removed. In addition to these there were numerous objects directly under the control of the National Institute which the officers would not permit to be removed. There was evidently still a lingering hope that Congress would make provision for the care of the collections. In this same year, 1858, another memorial was sent to Congress, asking for an appropriation for preserving the collections of objects of natural history intrusted to their care. This was unfavorably reported upon by the Senate committee (see Bibliography under Brown) and in the House was referred to the Committee on the District of Columbia, whose report showed that "the collections are now in the Smithsonian Institution" [Rhees, Documents, p. 653].

Some of these were, it is true, but there was still a miscellaneous collection, including many valuable objects, in the hall of the Patent

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*The following letter will serve to explain the nature of the ties, by which a part at least of the members were held to the organization:

SMITHSONIAN INSTITUTION, *January 5, 1852.*

MY DEAR SIR: I beg leave through you to thank the members of the National Institute for the honor they conferred upon me by my election as one of the vice-presidents, and to request that I may not be considered a candidate for reëlection.

I shall continue to be a member and hold myself responsible for my portion of the debt unavoidably incurred by the executive committee. It is my opinion that under its present organization the Institution can not advance the cause of American science, and that it may be productive of much evil.

I remain, very truly, your friend and servant,

JOSEPH HENRY.

PETER FORCE, Esq.

P. S.—I think it would be best to appoint a committee to inquire into the state of the Institution, and to advise as to what is to be done, and how the debts which have been incurred are to be paid. J. H.

†Proc. Nat. Inst., new series, I, pp. 47–48.

‡*Act of August* 4—Statutes X, 552.

Office, and known as "the National Institute." Of these a catalogue was published by Alfred Hunter in 1859.*

They were afterwards placed in some old cases in a passageway in the Patent Office, and many valuable specimens and books were destroyed or stolen, there being no one responsible for their safety.†

Prof. Baird told the writer that the books and specimens were placed on top of some file cases in a basement corridor, near an outer door, and that a person with a cane could at any time dislodge an armful and carry them away without impediment.

In 1861, shortly before the charter finally expired by limitation, the birds and insects were almost completely destroyed, and the library reduced to broken sets of periodicals and transactions. Such as they were, they were delivered by the Secretary of the Interior to the Smithsonian Institution.‡

This was the end of the National Institute and its efforts to found a national museum, the end of the National Cabinet of Curiosities, and of the National Gallery except so far as it continued in the possession of the Washington relics and the Franklin press exhibited in one of the halls of the Patent Office.

THE SMITHSONIAN INSTITUTION AND THE NATIONAL CABINET OF CURIOSITIES.

After ten years of discussion, a bill to incorporate the Smithsonian Institution received the approval of Congress and the President. The charter, in its final form, does not appear to have represented fairly the views of any one party, except that which favored the library and incidentally the museum. Several special provisions, not from our present point of view, harmonious with the spirit of Smithson's bequest, were eliminated, and the act, as finally passed, while broad enough to admit upon the foundation almost any work for intellectual advancement, was fortunately expressed in such general terms as to allow a large share of liberty to the trustees or regents.

The Smithsonian Institution has had upon its governing board many of the noblest and wisest of the men of the nation, and the Regents to whom, during the first four years of its corporate existence, the decision of its policy and its future tendencies was intrusted, were chosen from among the very best of those at that time in public life.

Among them were George M. Dallas, the first chancellor, at that time Vice-President of the United States; Chief Justice Taney; Rufus Choate, of Massachusetts; Robert Dale Owen, of Indiana; George P. Marsh, of Vermont; Lewis Cass, of Michigan; Jefferson Davis, of Mis-

* Hunter's Bibliography.

† It is said that some enlightened Commissioner of Patents, in power between 1850 and 1860, was annoyed by the presence of a collection of fossil vertebrates in one of the rooms in his building, and without consulting any one sent them to a bone mill in Georgetown, where they were transformed into commercial fertilizers—once for *thought, they now became food for the* farmers' crops.

‡ *Smithsonian Report, 1862, p. 15.*

sissippi; James A. Pearce, of Montana; James M. Mason and William Winston Seaton, of Virginia; John McPherson Berrien, of Georgia; William C. Preston, of South Carolina; William J. Hough, of New York; Alexander Dallas Bache, Superintendent of the Coast Survey, and Gen. Joseph G. Totten.

The Regents soon realized that in order to carry out efficiently the trust which had devolved upon them, it would be necessary to decide upon a definite course of policy, and to settle for themselves the interpretation of certain of the provisions in the act of incorporation.

A committee was appointed at once to digest a plan to carry out the provisions of the "Act to establish the Smithsonian Institution," and on January 25, 1847, this report was made, signed by Robert Dale Owen, Henry W. Hilliard, Rufus Choate, and Alexander Dallas Bache, after having made a preliminary report December 1, which was recommitted to the committee December 21.

These dates are mentioned in order to afford opportunity for the remark that in the interval between December 1 and December 21 Prof. Joseph Henry had been elected to and accepted the Secretaryship of the institution, and that previous to his election he had submitted to the Regents a sketch of a proposed plan of organization, which appears to have been acceptable to the majority of the Board, and that in this sketch were printed opinions which had from that time on a most powerful, and in time a controlling, influence upon the policy of the Institution.*

The election of Professor Henry was in accordance with the view held by the Regents, and expressed in the report of the committee, and even more forcibly in the resolutions of the Board, that the Secretary must of necessity become the chief executive officer of the Institution, and "that upon the choice of this single officer, more probably than on any one other act of the Board, will depend the future good name and success and usefulness of the Smithsonian Institution.†

The choice of Prof. Henry was by no means the unanimous act of the Regents, and since in respect to personal qualifications he undoubtedly fulfilled the requirements of the resolution passed by the Board previous to the election of a Secretary, it is clear that some of the Regents did not look with favor upon his plan of organization.

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* At a meeting of the Joint Committee on Public Buildings and Grounds in February, 1865, Prof. Henry said: "I have been from the first, now eighteen years, the Secretary or Executive Officer of the Smithsonian Institution. * * * Before my election I was requested by one of the Regents to give a sketch of what, in accordance with the will of Smithson, I considered should be the plan of organization, and after due consideration of the subject there was not the least shadow of a doubt in my mind that the intention of the donor was *to found a cosmopolitan institution, the effects of which should not be confined to one city, or even to one country, but should be extended to the whole civilized world.*"—(Rep. Com., No. 129, Thirty-eighth Congress, second session.)

† 1847. Smithsonian Institution. Report of the Organization Committee of the *Smithsonian Institution*, etc. Washington, 1847, pp. 18–19.

Of the twelve votes cast at the election December 3, 1846, seven were in favor of Prof. Henry, five for persons who had been officers of the old National Institute, and closely associated with its policy.

A bare majority—for the change of one vote would have made a tie—then placed itself on the side of the Henry policy. In its report the Committee on Organization speaks plainly of "two great conflicting opinions" in the Board, for the harmonizing of which the "compromise" so often referred to during the struggle of the following six years.

One party was in favor of devoting the larger part of the income to the library and museum.

The other party favored rather the publication of scientific memoirs, grants for the promotion of original researches, and the maintenance of a lecture system.*

The "compromise" consisted in the division of the annual income into two nearly equal parts, to be applied to the two classes of expenditures, $15,000 to library and museum and the remainder ($15,910) to publication, research, and lectures.†

On one subject, however, the Regents seem to have been unanimous, and to have given their opinion in the following resolution:

Resolved, That it is the intention of the act of Congress and in accordance with the design of Mr. Smithson, as expressed in his will, that one of the principal modes of executing the act and the trust is the accumulation of collections of specimens and objects of natural history‡ and of elegant art, and the gradual formation of a library of valuable works pertaining to all departments of human knowledge, to the end that a copious storehouse of materials of science, literature, and art may be provided, which shall excite and diffuse the love of learning among men, and shall assist the original investigations and efforts of those who may devote themselves to the pursuit of any branch of knowledge.§

The great building which, by the terms of this charter, the Smithsonian Regents were requested to erect and pay for was to be "of sufficient size and with suitable rooms or halls for the reception and arrangement *upon a liberal scale* of objects of natural history, including a geological and mineralogical cabinet, a chemical laboratory, a library, a gallery of art, and the necessary lecture rooms;" and this was coupled with the accompanying provision, that, "in proportion as suitable arrangements can be made for their reception," all objects

* To the library and museum party belonged without doubt Senator Choate, Mr. Owen, and probably Mr. Rush and Gen. Totten, who were both devoted to the interests of the National Institute. Mr. Bache was, I suppose, the leader of the opposition.

† Report of Committee on Organization, p. 21.

‡ In this resolution for the first time the term *natural history* is given its proper scope, as including not only zoölogy and botany, but geology, mineralogy, and ethnology, although in the report of the committee a distinction seems to have been made, probably for the purpose of better definition.

§ Report of Committee on Organization, p. 20.

suitable for a museum or gallery of art which the United States at any time might possess *shall be delivered* to the Regents and *shall be arranged* in the building.

The national collections then existing and those afterwards to accumulate, were thus transferred to the governing board of the Smithsonian Institution as a contribution from the United States to the resources of the Institution, and were evidently intended in a certain way to counterbalance the gift of James Smithson for the same purpose.

The intention of Congress is evident, and the law was almost mandatory in character. There was one phrase in the law, however, which gave opportunity for adjustment of terms.

The provision that the delivery of these objects should take place "in proportion as suitable arrangements could be made for their reception," was, it may be, intended to give the Institution time for careful and thorough preparation. This placed no limit upon the time for completing the buildings, and indeed gave to the Board of Regents the right to indicate the time when "suitable arrangements" could be made.

It was undoubtedly the wish of the members of the Twenty-ninth Congress that the expense and responsibility of organizing and maintaining a national museum should be transferred forever to the Smithsonian Institution, and it was quite far from their intention that the public treasury should ever be called upon for aid.

Not only the National Museum, the National Library, and a national chemical laboratory were thus assigned, but also the expense of keeping up the previously neglected public park in which the Smithsonian buildings were to be erected. It was only by accident that a national observatory and an institution corresponding to the present Department of Agriculture were not added to the burden.

That was the day of small beginnings. The theory of our form of government had not been settled in the minds of our public men, and every new project brought up for discussion in Congress became the subject of long and tortuous discussions. There were Congressmen who ten years after the acceptance of the Smithson legacy were in favor of returning the money to England to be given to anyone who could legally take it, while Andrew Johnson, of Tennessee, in 1845 endeavored to overthrow what had already been established and to substitute a "Washington University for the benefit of the indigent children of the District of Columbia in memory of and out of respect to George Washington, the Father of his Country."*

The will of the Twenty-ninth Congress was not necessarily that of the Thirtieth. Mr. Hilliard, of Alabama, made a bold and successful stroke for the independence of the Board of Regents, and defeated a motion to appoint a regular Congressional committee to supervise and report upon their proceedings. This was a step toward securing the

* Rhees. Documents, p. 489.

recognition of the right of the Regents to interpret for themselves the true meaning of the charter.

The next Congress was still less disposed to exercise a minute system of control, and the Regents, through Senator Jefferson Davis, boldly asserted that it was improper for Congress to interfere with the administration of a fund which it has confided to a Board of Regents not entirely formed of members of Congress and not responsible to it."*

The attitude of Prof. Henry from the beginning to the end of the thirty-one years of his secretaryship was singularly independent and outspoken. Having before his election submitted to the Board of Regents a plan of organization which met with their approbation, he was elected with the understanding that he was to carry this plan into effect.

He was from the beginning in a certain way the authorized interpreter of the Smithsonian bequest, and, as every one knows who has studied the history of the Institution, his earnest and steadfast policy and the wonderful clearness and force with which he explained his views, supported by his scientific eminence and his grandeur of character, gave him a wonderful influence with the successive bodies of men who acted as regents.

His influence from the very start was on the side of publication and original research and in opposition to constant expenditure of what in time he began to designate as "local objects."

His attitude toward museum and library, especially the former, was at first a noncommittal one. He proceeded slowly, evidently not from lack of courage, but with the methods of a man of science, studying the results of different courses of policy, and, when he expressed an opinion, speaking from the standpoint of experience.

The history of the National Institution and its fate, hopelessly involved and crushed to death by the weight of the collections and books which had been given or lent to it, was constantly brought to his mind, for the Institution was expected to take up this burden, with the prospect of unlimited additions to its weight, and to bear it alone and perhaps forever.

To him, and to the Regents also, it must have been evident that this burden once assumed, the fate of the Smithsonian Institution would eventually be similar to that of the National Institute.

More directly threatening was the evil of the immediate absorption of a large part of the income, to the detriment of the plans which seemed to him more likely to accomplish the wishes of the Institution.

The wisdom of Prof. Henry's policy has been almost universally conceded, and the success with which for thirty-one years he directed the resources of the Institution toward the increase and diffusion of knowledge compels the admiration of everyone who studies the history of his life in connection with that of the Institution, and had done so for many years before his death.

*Rhees, *Documents*, p. 590.

It is now evident that but for his conservative policy the history of the Institution would have been comparatively insignificant.

In the light of subsequent events, it is safe to assert that, in all probability, had the Smithsonian Institution taken charge of the "National Museum" in the manner proposed in 1846, the result would have been even more detrimental to the Museum than to the Institution.

It did not seem so at the time, however, and for ten years the course of the Institution was under the subject of criticism of a very serious kind.

It is of course not essential to review at length the discussions which took place within the first ten years between the officers of the Institution, in the meetings of the Regents, in Congress, and in the public journals, as to the authority of the Board of Regents and the Secretary to deviate from a strict interpretation of the act of incorporation, which was presumed to embody the will of Congress. There was a party who was of the opinion that a large part of the income should be devoted to the accumulation of a great general library, and who fought boldly in defense of this project. The conflict culminated in 1856, with the dismissal of the librarian by Prof. Henry, a Congressional investigation, and the resignation of two of the most active Regents. The Board upheld the Secretary, and successfully maintained both in House and Senate the position that they as trustees of the Smithson bequest were not amenable to the advice or instructions of Congress, and were the only authorities qualified to interpret the meaning of the act of incorporation and the intention of Smithson, the founder.

The immediate cause of this final outbreak was the repeal in 1855 of the resolution passed in 1846 dividing the income of the Institution into two nearly equal parts for two specific objects, the advocates of a great library being of the opinion that the spirit of this resolution had not been regarded.

The resignation of Senator Choate and Mr. Meacham, and the unqualified indorsement of the Secretary by the other members of the Board greatly strengthened his position, and enabled him to cope more successfully with the question of the admission of the Government museum to the Smithsonian buildings, for the transfer provided for in 1846 had not up to 1856 been definitely arranged for.

The history of the treatment of this matter is very important, since it leads up to the origin of the present relationship existing between the Government, the National Museum, and the Smithsonian Institution.

The delay in the completion of the Smithsonian building afforded to the Regents an opportunity for a gradual development of the plan of organization. Until the building should have been furnished the resolution giving half of the income to library and museum was not obligatory, nor was it possible for the custody of the Government museum to be finally transferred.

The corner stone was laid May 1, 1847, but the work was in progress until 1855.

The delay was evidently intentional, for in 1848 Prof. Henry, in an exposition of Smithson's bequest before the New Jersey Historical Society, spoke as follows:

He regretted that in order to make provision for the accommodation of the museum of the exploring expedition, as directed by act of Congress, so large an amount of money was required for the erection of the buildings. The evil, however, which would result from this is in a measure obviated by the plan proposed by Prof. Bache, and adopted by the Regents, viz, that of deferring the time of completing the building, so that it might be erected in considerable part by means of the interest of $240,000, which had accrued in interest on the original fund previous to the year 1846.*

As early as 1847 Prof. Henry seems to have entertained the hope of escape from the full acceptance of the terms of the charter, for in his first plans, as finally submitted to the regents, he expressed the hope "that in due time other means may be found of establishing and supporting a general collection of objects of nature and art at the seat of the General Government with funds not derived from the Smithsonian bequest."†

In the report for the year 1849, presented in 1850, Prof. Henry gave the result of his later observations and reflections, and for the first time took his stand in opposition to the transfer, advancing the theory that it was not obligatory on the regents to take charge of the Government collections. He wrote:

This law evidently gives to the Smithsonian Institution the museum in the Patent Office, the conservatory of plants, and all specimens of nature and art to be found in the several offices and departments of the Government. The act, however can not be construed as rendering it obligatory on the regents to take charge of these articles, if, in their opinion, it is not for the best interests of the Institution that they should do so. Though one of the reasons urged upon the regents for immediate erection of so large a building was the necessity of providing accommodation for this museum, I have been, from the first, of the opinion that it was inexpedient to accept it.

This museum was collected at the expense of the Government, and should be preserved as a memento of the science and energy of our Navy, and as a means of illustrating and verifying the magnificent volumes which comprise the history of that expedition. If the regents accept this museum it must be merged in the Smithsonian collections. It could not be the intention of Congress that an institution founded by the liberality of a foreigner, and to which he has affixed his own name, should be charged with the keeping of a separate museum, the property of the United States. Besides this, the extensive museum of the Patent Office would immediately fill the space allotted for collections of this kind in the Smithsonian edifice, and in a short time another appropriation would be required for the erection of another building.

* Henry, Smithson, Bequest, p. 8.

† Report for 1847, p. 184; Report for 1848, p. 33; Rhees Documents, p. 958.

Moreover, all the objects of interest of this collection have been described and figured in the volumes of the expedition, and the small portion of our funds which can be devoted to a museum may be better employed in collecting new objects, such as have not yet been studied, than in preserving those from which the harvest of discovery has already been fully gathered.

The answer made to some of these objections has usually been, that the Government would grant an annual appropriation for the support of the museum of the exploring expedition. But this would be equally objectionable, since it would annually bring the Institution before Congress as a supplicant for Government patronage, and ultimately subject it to political influence and control.

After an experience of three years, I am fully convinced that the true policy of the Insiitution is to ask nothing from Congress except the safekeeping of its funds, to mingle its operations as little as possible with those of the General Government, and to adhere in all cases to its own distinct organization, while it coöperates with other institutions in the way of promoting knowledge; and on the other hand, that it is desirable that Congress should place as few restrictions on the Institution as possible, consistent with a judicious expenditure of the income, and that this be judged of by a proper estimate of the results produced.

The regents and their secretary were in harmony.

In the Senate, April 15, 1850, the discussion of the bill for the completion of the Patent Office building elicited the following statement from Senator Jefferson Davis:

Mr. PRESIDENT: What the wants of the Patent Office are now is one thing, and what those wants will be in a few years is another and an entirely different thing. Not only from the report of the last Commissioner of Patents, but from inspection, if anyone choose to make it, and see the condition of things in that department, I think it may be denied that there is room enough in the present building for the wants of the department. If I understand the report of the present Commissioner of Patents or the Secretary of the Interior, the argument against the want of further room by the Patent Department is based upon the supposition that all which now belongs to the National Institute, all connected with the exploring expedition which now fills the museum of the Patent Office, is to be transferred to the Smithsonian Institution, That seems to be the basis of the conclusion. Now, sir, I wish to state to the Senate that Congress has no power to impose upon that institution the duty of taking charge of this collection of the exploring expedition, we may infer from their act, nor did they ever intend to do so. They gave to that institution the right to take all such curiosities brought home by the exploring expedition as might be desired for that institution, and I will inform the Senate that it is not the intention of the present Board of Regents of the Smithsonian Institution to take charge of the museum of the Patent Office, and the room appropriated to these curiosities will be required hereafter as now.

By its action in directing at this time the enlargement of the Patent Office, Congress appears to have accepted the ideas of Senator Davis, or, as Prof. Henry expressed it, "concurred in the opinions expressed in

the Senate by the Hon. Jefferson Davis, that it was a gift which ought not to be pressed upon the institution."*

In his report for 1851, Prof. Henry, sure of his position, spoke still more boldly. "It is to be regretted," said he, "that Congress did not leave the entire choice of the plan of organization to those who were to be intrusted with the management of the bequest."

These plain words were called forth by the fact that the building was still unfinished, and that a large additional appropriation from the fund was required to make it ready for occupation.

It is worth while to remember that his previous impressions of museums, or at least of recent years, had doubtless been founded upon the cabinet in the National Institute, which, before Prof. Henry came to Washington, had become completely torpid. Its collections, housed in a hall not under its control, belonged to it only in name. The miscellaneous assemblage of specimens in the hall of the Patent Office had been well described in the Smithsonian charter by the name "National Cabinet of Curiosities," for it did not deserve to be called a museum.

Prof. Henry evidently had that in mind in protesting against "a promiscuous collection," but for the first time explains that he does not underrate "the (scientific) importance of collections in themselves."

The following quotation will show, however, that he was not so averse to the museum idea as he had formerly been, although very doubtful as to the advisability of accepting aid from Congress:

The museum is to consist, according to the law of Congress and the terms of the compromise, of "objects of art, of foreign and curious research, and of natural history; of plants, and geological and mineralogical specimens." It would, however, be unwise in the Institution to attempt the formation of full collections of all these objects, or, in other words, to form an establishment similar to that of the British Museum. The whole income devoted to this object would be entirely inadequate. The portion of the main building appropriated to the museum consists of a single room 200 feet long by 50 feet wide. This space may be entirely filled in the course of three years, without the purchase of a single article, if the means be adopted which present themselves at the seat of Government for making collections. But when this space is filled the accumulation of specimens must cease, or an addition be made to the building, which, to harmonize with the present edifice, would involve a large expenditure. The question then arises, from what source is this money to be obtained? It can not be derived from the annual income of the capital, for this would cripple the more important operations. It may be said that Congress will

* The National Museum, although the designation proposed in Mr. Ingersoll's amendment to the Owen bill for the Smithsonian Institution was never legally sanctioned, was understood to be under the charge of the Smithsonian from the time of its incorporation. The museum clauses of the charter were so understood by the first regents and by Prof. Henry, who, in his first programme of organization, in 1847, wrote: "When the building is completed, and when in accordance with the act of Congress the charge of the National Museum is given to the Smithsonian Institution, other assistants will be required."

furnish the means; but this is relying on a very uncertain source, and the policy of applying to Congress for any aid is doubtful.

Having said this much, it was easy to continue by expressing the opinion that the Regents had been in error in supposing it necessary to put up a building for the reception of the great museum of the exploring expedition presented by Congress.

The next year made some change in the views of Prof. Henry. The presence of his new assistant secretary, Prof. Baird, and the evidence of the collection that was now growing up under his own eyes, that museums may be made important agencies for scientific discovery, had perhaps increased his personal interest in such matters.

And again:

Though the formation of a general collection is neither within the means and province of the Institution, it is an object which ought to engage the attention of Congress. A general museum appears to be a necessary establishment at the seat of government of every civilized nation. * * * Indeed, the Government has already formed the nucleus of such a museum in the collection now in the Patent Office.

An establishment of this kind can only be by Government, and the proposition ought never to be encouraged of putting this duty on the limited though liberal bequest of a foreigner.

The Smithsonian Institution will readily take the mental direction of an establishment of this kind, give plans for its organization and arrangement, provided it be requested to do so, and the means for effecting the object be liberally supplied.*

In the report for the year 1852 Prof. Henry definitely stated that the Regents had concluded that it was not advisable to take charge of the great museum of the exploring expedition,† and also expressed the hopeful opinion that "there can be little doubt that in due time ample provision will be made for a library and museum at the capital of this Union worthy of a government where perpetuity depends upon the virtue and intelligence of the people."‡

In the report for the year 1853, presented January 14–March 11, 1854, another step toward the transfer of the museum is chronicled. The Secretary wrote:

I have been informed by the Commissioner of Patents that the space now occupied in the building of the Patent Office by the National Museum is imperatively required for the display of models; and he suggests that a part or the whole of the Smithsonian building shall be purchased for the deposit of this collection. If Congress will entirely relieve the Smithsonian fund from the expense of collecting and maintaining a museum, a large portion of the present building would be unnecessary, and the proposition to purchase a part or the whole of it might be properly entertained. [The Smithsonian Institution, if required, would take the supervision of a Government museum, and would turn over to it all the specimens collected after they had been examined and described. The importance of a collection at the seat of Govern-

* (Report for 1851, p. 25.)

† Sixth Annual Report, p. 253.

‡ *l. c.*, p. 253.

ment to illustrate the physical geography, natural history, and ethnology of the United States, can not be too highly estimated. But the support of such a collection ought not to be a burthen upon the Smithsonian fund.

The year 1854 was the stirring one in the history of the Institution, and little was done towards the transfer of the museum. The great lower hall, having been completed, was lying idle. The Smithsonian collections were rapidly increasing under the management of Prof. Baird, of whose work in this direction more will be said later, and a considerable number of Government collections had come directly into the custody of the Institution—in bulk and value more extensive than those in the Patent Office, those of the exploring expedition excepted.

In this year, too, the custody of the Patent Office collection was transferred to the Commissioner of Patents, and an appropriation made for their support.

In 1855, in his report, presented March 1, 1856, the Secretary said:

> The lower story of the main building consists of one large hall, to be appropriated to a museum or library. It is at present unoccupied, but will be brought into use as soon as the means are provided for furnishing it with proper cases for containing the objects to which it may be appropriated.

In another place he expressed the hope that Congress would in due time relieve the Institution from the support of the building, and ultimately appropriate the greater part of it to a *national* museum.*

This was the first time that the term National Museum was publicly used by Prof. Henry or in the reports of the Smithsonian Institution—a significant fact, and one which shows a step in the progress of the museum idea and a revival of the plan promoted by the National Institute from 1840 to 1846.

The fact that the Smithsonian museum, in itself, could now claim to be the best general collection of natural history so far as North America was concerned probably stimulated the Secretary's enthusiasm, for he announced the fact in the report with evident pride.

In March, 1856, the subject of the removal of the collections from the Patent Office was presented to the Regents by the Secretary, but the minutes contain no record of their decision.

In the Secretary's report for 1856, presented to the Regents January 26–28, 1857, the matter came up again for remark, and Prof. Henry, as was his custom, spoke of the obstacles to the progress of the Institution caused by the restriction of the charter, and recurring to the museum, said:

> The adverse effects of the early and consequently imperfect legislation ought, therefore, as far as possible, to be obviated; and this would readily be done if Congress would relieve the Institution from the care of a large collection of specimens principally belonging to the Government, and purchase the building to be used as a depository of all the

* Report 1855, p. 16.

objects of natural history and the fine arts belonging to the nation. If this were done a few rooms would be sufficient for transacting the business of the Institution, and a large portion of the income would be free to be applied to the more immediate objects of the bequest. Indeed, it would be a gain to science could the Institution give away the building for no other consideration than that of being relieved from the costly charge of the collections; and, for the present, it may be well to adopt the plan suggested in a late report of the Commissioner of Patents, namely, to remove the museum of the exploring expedition, which now fills a large and valuable room in the Patent Office, wanted for the exhibition of models, to the spacious hall of the Institution, at present unoccupied, and to continue under the direction of the Regents the appropriation now annually made for the preservation and display of the collections.

Although the Regents a few years ago declined to accept this museum as a gift, yet, since experience has shown that the building will ultimately be filled with objects of natural history belonging to the General Government, which, for the good of science, it will be necessary to preserve, it may be a question whether, in consideration of this fact, it would be well to offer the use of the large room immediately for a national museum, of which the Smithsonian Institution would be the mere curator, and the expense of maintaining which should be paid by the General Government. The cost of keeping the museum of the exploring expedition, now in the Patent Office, including heating, pay of watchmen, etc., is about $5,000, and if the plan proposed is adopted the Institution and the Patent Office will both be benefited. The burden which is now thrown on the Institution, of preserving the specimens which have been collected by the different expeditions instituted by Government during the last ten years, will be at least in part removed, and the Patent Office will acquire the occupancy of one of the largest rooms in its building for the legitimate purposes of its establishment. It is believed that the benefit from this plan is so obvious that no objection to it would be made in Congress, and that it would meet the approbation of the public generally.

I can find no record in the minutes of the Regents, but have been informed by Mr. W. J. Rhees, of the Smithsonian Institution, that an urgent request for the use of the hall was made by the Commissioner of Patents and the Secretary of the Interior, and that the Board decided to grant this request on the condition that Congress should appropriate money for the construction of the cases and the transfer of the collections, and that the Secretary of the Interior should provide for the expenses of the care of the collections after their transfer in the same manner as before.

The question of the legality of the transfer of the collections was submitted by the Secretary of the Interior to the Attorney-General, by whom it was held that the provision in the eighth section of the act of August 4, 1854 (10 Stats., 572), placing the collections under the control of the Commissioner of Patents, and authorizing the employment by him of keepers therefor, was designed to be temporary only, and that the act establishing the Smithsonian Institution, as well as that making the appropriation in 1857, were to be regarded as indicat-

ing the purpose of Congress respecting permanent provision for these collections.*

The appropriation of 1857, referred to by the Attorney-General, was one giving $15,000 for the construction of cases and $2,000 for the removal of the collections. (March 3, 1857. 11 Stats., 219.)

In commenting upon this action, Prof. Henry, in his report for 1857, remarked:

At the last session of Congress an appropriation was made for the construction and erection of cases to receive the collections of the United States exploring expedition and others in Washington, and also for the transfer and arrangement of the specimens This appropriation was granted in accordance with the recommendation of the late Secretary of the Interior and the Commissioner of Patents, in order that the large room in the Patent Office occupied by the museum might be used for the more legitimate purposes of that establishment. We presume that the other part of the recommendation will also be carried out, namely, that the annual appropriation be continued which has heretofore been made for the care of this portion of the Government property. While, on the one hand, no appropriation should be made which would serve to lessen the distinctive character of Smithson's bequest, on the other it is evident that the Government should not impose any burdens upon the Institution which would impair its usefulness or divert its funds from their legitimate purpose.†

In 1853, by the act of June 2 (11 Stats., 301), an appropriation of $4,000, "for the preservation of the collection of the exploring and surveying expeditions of the Government," was made as a contingent expense in the office of the Secretary of the Interior.

The management of this appropriation and of all which followed it from year to year was always placed entirely in the hands of the Secretary of the Smithsonian Institution.

In the report for 1858, Prof. Henry gave the following concise history of the relations of the Smithsonian Institution to the national collections:

It will be recollected that by the law of Congress incorporating this Institution "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging to, or hereafter to belong to the United States which may be in the city of Washington, in whosesoever custody the same may be, shall be delivered to such persons as may be authorized by the Board of Regents to receive them."

The law thus giving to the Smithsonian Institution all specimens illustrative of nature and art to be found in the several offices and departments of Government was not construed as rendering it obligatory on the Regents to accept these objects if they considered it expedient to do so. Inasmuch, then, as this collection was neither essential to the plan of organization nor directly subservient to the comprehensive purpose of the donor in regard to a world-wide benefit, it was the ultimate decision of a majority of the Board that it ought not to be ac-

* Letter of Hon. William F. Vilas, Secretary of the Interior, to the Secretary of the Smithsonian Institution.

† Smithsonian Report, 1857, p. 14.

cepted and that no part of the donation ought to be expended in the care of property belonging to the Government of the United States.

Previous to the discussion of this question it had been assumed that the Regents were under an obligation to take charge of the museum, and, on this account principally, a large and expensive building had been thought necessary. After it was settled, however, that the Regents were not bound to accept this trust the work of construction was carried on more slowly with a view at once to secure certain advantages to the building itself, and to increase the principal by funding the interest of the money which would be absorbed by its completion.

In the meantime a very large amount of specimens of natural history had accumulated at the Institution from numerous exploring parties, sent out by the General Government; and as these collections had been made under the direction of the Institution, and their preservation was of the highest importance to the natural history of the country, it was finally concluded that if Congress would make an appropriation for the transfer and new arrangement of the articles then in the Patent Office, and continue the annual appropriation previously made for their care and exhibition while in charge of the Commissioner of Patents, the Institution would, under these conditions, become the curator of the national collections. This proposition was agreed to by the Government, and the contemplated transfer has accordingly been made.

It is believed that this arrangement will be mutually beneficial to the Patent Office and the Institution, since the former will be relieved from a duty scarcely compatible with the design of its establishment, and will gain possession of one of the largest rooms in the city for the exhibition of a class of models to which the public have not previously had ready access; while the Smithsonian Institution will be able to present to the strangers who visit Washington a greater number of objects of interest, and appropriate that portion of the large building not required for its own most important operations to a useful purpose.

The cost of keeping the collections at the Patent Office, including fuel, was about $4,000 annually, but the Regents might, with justice, have asked for an additional amount sufficient to pay the interest on the cost of that portion of the edifice occupied by the museum. It was, however, thought more prudent to restrict the application to the sum above mentioned, and to request that the appropriation might be continued under the charge of the Secretary of the Interior, thus obviating the necessity of an annual application to Congress by the Institution itself.

The cases at present required for the accommodation of the collections have been constructed at a cost within the appropriation made for that purpose; and the Institution is indebted to Hon. J. Thompson, Secretary of the Interior, and Hon. J. Holt, Commissioner of Patents, for the use of glass, sash, and shelving no longer needed in the room which formerly contained the museum in the Patent Office, but which have been applied to good purpose in supplying deficiencies in the Smithsonian building. The Regents are also indebted to Thomas U. Walter, esq., Architect of the United States Capitol Extension, for the beautiful design of the cases, and to Edw. Clark, esq., architect of the Interior Department, for the inspection of the work during its progress, and the examination of the accounts presented by the contractor.

In order to increase the capacity of the large room appropriated to the collection, the cases have been arranged in two stories, forming a series of alcoves, and a gallery on each side. By the adoption of this plan space can be provided for double the number of specimens which were exhibited at the Patent Office.

A considerable portion of the collections has been arranged, and a taxidermist employed to repair the specimens of zoölogy which have been damaged, and to prepare for exhibition others which had not previously been mounted. The museum will soon be an object of continued and increasing interest to the inhabitants of the city and to strangers who visit the capital of the United States.

An assent to the arrangement above stated for taking charge of the Government collections is by no means inconsistent with the regret expressed in previous reports that the law of Congress directed provision to be made from the Smithsonian fund for a public museum and library. It must be evident to any one who attentively studies the past history of the operations of the Institution that the interest of the money expended on the building intended for this purpose would have been much more efficiently applied in the development and publication of new truths. But, in all cases where many views are to be consulted, the question is not merely what *ought* to be, but what *can* be accomplished. From the first there has existed a clear conception of the means by which the idea of the donor could be best realized, and the aim of the majority of the regents has continually been to approximate, as nearly as the restrictions of Congress would allow, to the plan originally proposed. The policy has been invariably the same, and the present reputation and generally acknowledged success of the Institution are the result of this undeviating course.*

The portion of the Smithsonian income which can be devoted to a museum and the $4,000 per annum appropriated by Congress would not together be sufficient to establish and sustain a general collection of specimens of the natural history of the world. It will therefore be the policy of the Institution, unless other means are provided, to confine the collections principally to illustrations of the products of the North American continent. For this purpose efforts have been made, principally through the various exploring expeditions, to obtain a large number of specimens of all the species of the different kingdoms of nature found in North America; and at this time the collection under charge of the Institution is more extensive in number and variety than any other which has ever before been made relative to this portion of the globe. It is not in accordance with the general organization of the Institution to form a museum of single specimens, interesting only for their rareness, but to collect a large number of specimens of each species, particularly of such as have not been described, and to distribute these among the several naturalists who may have the industry, ability, and the desire to study them; the primary object of the Institution, namely, the increase of the existing sum of knowledge, in this case as in all others, being kept prominently in view.

The Institution has now become the curator of the collections of natural history and ethnology of the Government, and by law is empowered, as it appears to me, to make the same disposition of the materials contained in these collections as it does of those procured at its own expense. The design will be to render the specimens in the greatest degree serviceable to the advance of knowledge. The Museum now consists of the following collections, of which, according to Professor Baird, about one-fifth were brought from the Patent Office.

First, those of the naval expeditions; second, those of the United States geological surveys; third, those of the boundary surveys; fourth, those of surveys for railroad routes to the Pacific; fifth, of miscellaneous

* Smithsonian Report, 1858, pp. 13–16.

expeditions under the War and Navy Departments; sixth, those of miscellaneous collections presented or deposited by societies and individuals; and lastly, of an extensive series of the results of explorations prosecuted by the Institution itself. By far the greater portion of the whole has been made under the stimulus and immediate direction of the Smithsonian Institution. A number of the special collections are still in the hands of those to whom they were intrusted for scientific investigation and description. The arrangement of the cases and the disposition of the articles intended for public exhibition has been a subject requiring considerable thought and experiment. It was not only desirable to obtain the largest amount of space for the accommodation of the articles, but also to arrange the whole so as to harmonize with the architectural embellishments of the large hall, and thus to produce a proper æsthetical effect.*

In 1859, the Guide Book, unofficial yet issued by an official of the staff, was published with the words Guide to the Smithsonian Institution and National Museum on its cover, and about this time the words National Museum of the United States were painted over the door of the exhibition hall.

Congress did not, however, give legal sanction to the use of this name until nearly twenty years later, when providing for the erection of the new building to receive the collections given to the Smithsonian Institution at the close of the Centennial of 1876.

WASHINGTON, *February, 1891.*

NOTE A.

JANUARY 1, 1842.

To the Hon. J. C. SPENCER and
The Hon. A. P. UPSHUR:

GENTLEMEN: The undersigned, a committee on behalf of the National Institution for the Promotion of Science, have the honor to submit to your consideration the following facts and remarks.

In a law of the 20th July, 1841, there is a provision in these words: "For the purpose of enabling the Secretaries of the War and Navy Departments to place in a state of safe preservation the specimens of natural history which are now deposited in their respective offices, or which may be brought there resulting from surveys of the unexplored regions of our own country, or from the exploring expeditions now in the South Seas, by the authority and at the expense of the United States or otherwise, a sum not to exceed five hundred dollars."

And in a law of March 3, 1841, there is another appropriation "For defraying the expense of transporting to the city of Washington and of arranging the collections made by the exploring expedition, five thousand dollars."

These laws are considered as having determined the principles which should govern in such cases.

First, that the expenditures should be made under the direction of the Secretaries of the War and the Navy Departments; and

Second, that the collections should be brought to Washington and arranged there.

In the discharge of these duties, the Secretaries of the two Departments named directed the collections referred to to be delivered to the care of the National Institution, for the purpose of being arranged under its supervision.

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* *Op. cit.*, 1858, pp. 40, 41.

On these accounts, as well as because of your position of directors of the Institution, we have now the honor of addressing you.

The first appropriation of $500 was expended under the personal superintendence of the Secretary of War, he approving all accounts; the second, under that of the Secretary of the Navy. But in the course of the business this duty assumed the following form:

The society appointed a committee to supervise the arranging of the collections. It was the duty of this committee to suggest the expenditures and employments which it considered necessary, to examine into the accounts, and if it found the same to be correct, to recommend them to the approval of the Secretary. Under this system the appropriations have been expended, and the Institution is now without further means.

It is proper to remark that the entire collections of the Institution, as well in books as in specimens of natural history and of the arts, and as well those deposited by the Government as those given by individuals and other institutions and from foreign governments, will in the end belong to the United States, there being a provision to that effect in the constitution of the Institution. The whole can therefore with propriety be considered as public property.

With this brief exposition we shall now lay before you the state of the affairs of the Institution in reference to the collections, deposits, gifts, and expenditures.

The entire collection is deposited in the upper rooms of the Patent Office; it consists of:

Donations from foreign governments.

Donations from other institutions, foreign and domestic.

Donations from ministers and consuls abroad, and from officers of our Army and Navy.

Donations from individuals and from members of the Institution.

The Iowa collection of mineralogical and geological specimens, made by R. R. Owen, esq., under the direction of the Treasury Department.

The collection of mineralogical and geological specimens which had been in deposit in the bureau of the Corps of Topographical Engineers.

The collection of portraits of distinguished Indians, and the collection of Indian curiosities which had been on deposit in the War Department.

The minerals, books, papers, and personal effects of the Smithsonian bequest.

The two shipments which have been received from the exploring squadron, consisting of minerals, specimens of natural history, works of art, implements of war and curiosities.

The books, minerals, and works of art belonging to the late Columbian Institute.

The books, papers, and proceedings of the late American Historical Society.

Cabinets and specimens, deposited by members in trust, for public use.

It can not be said that these materials are now arranged. The space which has been appropriated to the temporary use of the Institution—the eastern half of the upper room of the Patent Office—is entirely insufficient for such a purpose, as well as the means and time which have been devoted to them. But as more just conception in those respects, as well as the value of the collections, will be derived from an exhibition in detail of the latter, it will now be laid before you:

About 1,000 volumes of books and numbers of pamphlets.

About 50 maps and charts.

About 500 castings in plaster, medals, and seals.

Ten pieces of statuary, marble, or plaster.

One hundred and sixty-eight paintings.

About 1,600 bird skins, of which rather more than 400 have been cleaned, stuffed, and mounted, and deposited in cases, but which yet require eyes and to have labels properly written and affixed. They also require to be scientifically arranged, the first labor being necessarily limited to the preparing of the skins and putting them

under the protection of cases. It may be proper to remark that to clean, stuff, and put in position 6 bird skins a day, is the greatest result from the labors of an expert and experienced taxidermist, and that so much can be done only with skins in good order and of moderate-sized birds. Much less is the most that can be done with skins that have been twisted and for a long time closely packed, or with skins of large birds or of quadrupeds; a single skin of a large bird often requiring from one to two days.

About 160 skins of quadrupeds, about 50 of which have been stuffed, set up, and put in cases.

About 200 glass jars have been filled with mollusca, fishes, and reptiles, but these yet require to be divided into more jars and to be arranged, classified, and named; and there yet remains two barrels and ten kegs of wet and soft specimens, which have not been opened, except to replenish, when necessary, the preservative material.

There are about 50,000 botanical specimens, embracing many that are extremely rare and entirely new. An able botanist, Mr. Nuttall, who has had the examination of this collection, pronounced it equal, if not superior, to any in the world of the kind and from the same regions. He was for a short time employed to aid in the arranging of the specimens, and assigned them to orders and genera, but they yet require the greater labor of specific distinctions.

There are about 3,000 specimens of insects, the greater part of which have been arranged in genera, but yet require the further and more laborious arrangement into species. A large collection of insects, said to be one of the finest of Europe, has lately arrived in New York to be placed in deposit in the Institution for the benefit of the public. It is from that well-known and eminent naturalist, C. F. Castelneau, esq., a member of the Institution. We have also notice of a collection of minerals being on its way from the School of Mines of Paris, as a present to the Institution.

There are probably several hundred thousand shells, constituting a mass of from 30 to 40 bushels, all valuable and many of them very rare, entirely new and extremely beautiful. With these nothing has yet been done but to open the boxes and clean a few of them. Many conchologists have pronounced this the finest collection in the United States. It will require much labor and time to arrange it.

About 500 corallines have been cleaned and partially arranged. About 300 starfish, echini, radiati, etc., have received a like attention; also about 100 sponges and about 2,000 crustacea. And there are yet many more specimens of these, several hundred, which have not been examined.

About 50 fish skins. These are yet in the same condition as when received.

About 7,000 specimens of minerals are placed under the protection of cases, but require a great amount of labor to arrange and label. There are also upwards of 50 boxes of mineralogical and geological specimens which have not been opened.

Accessions are daily made to the collections of the Institution in the form of donations, and we are now looking with some anxiety for additional shipments from the exploring squadron. Nor can it be doubted that when the squadron returns it will be freighted in value and number of specimens equal to all it may have sent home during its long and interesting voyage.

Already the specimens which have been placed in cases nearly fill the space, one-half of the upper room of the Patent Office, which the liberality of the Secretary of State assigned temporarily to the use of the Institution; but these specimens are of necessity in a crowded state of imperfect arrangement. And the specimens now on hand, when put up and properly displayed, will fill the whole of the room. We already, therefore, and with much reason, anticipate being straitened for space.

The occupation of our present place is also merely temporary. The room will in a few years be required for the purposes for which it was erected. This consideration necessarily affects the character of the labors of the Institution in reference to the collection, which can not fail to partake of the character of its occupation of the

room, and in consequence its labors are limited to such as are necessary and preliminary to a permanent and scientific arrangement.

The same consideration has influenced the employment which has been authorized. The committee to which this matter was intrusted by the Institution, did not feel authorized to recommend to the Department having charge of the appropriation any system which should involve the Government in a liability for one day beyond the enduring of the appropriation.

The appropriation has become exhausted, but the persons employed have continued their labors under the hope that the great work upon which they have been engaged and which has progressed with such flattering activity will not now be abandoned. These persons are:

H. King, esq., curator of the Institution, who has the general care of the collections which have been intrusted to the Institution, and who is held responsible to the Institution for their safe-keeping. His particular attention has been devoted to the minerals, mollusca, echini, radiati, spongia, and crustacea, and to the construction of the cases, procuring of the glassware, and other requisite materials. His compensation was fixed at first at $3 per day, but afterwards, in consequence of his being at much expense for trips he had to make to Philadelphia, New York, and Boston, and being liable to such trips in the execution of his duties, it was raised to $5 per day.

I. R. Townsend, esq., taxidermist. His duty is to dress, stuff, prepare, and arrange the skins. His compensation is $3 per day.

Mr. Nuttall, who was employed on the botanical specimens at $3 per day. He is not at present in employ, having other engagements.

One assistant, Mr. Pollard, at $1.50 per day.

One other assistant, who is also a good mechanic and arranger, Mr. Vardin, at $1.50 per day.

One messenger and laborer at $1 per day.

The occasional employ of laborers and mechanics.

All of the appropriations not required for these employments have been expended for cases, glassware, and other necessary contingencies to such an establishment, the accounts and vouchers for which have been duly rendered.

As before remarked, these arrangements are but temporary, nor are they commensurate to the mass of labor which has to be done, or to the just expectations which are entertained in reference to it. More force must be employed and more varied talent than the means appropriated have enabled the institution to command. With the experience which has been acquired, the committee will if desired, under the correcting hand of the Institution, submit to your consideration their views in reference to the expenditures of any future appropriation.

The funds of the Institution are of two kinds.

First, the amount derived from the annual tax upon members

Second, the amounts appropriated by Congress.

The first is necessarily small, from the few members liable to the tax, and the amount of it, for each, $5 per annum; and it is expended for rare and necessary books, necessary printing, cases, and other contingencies.

The second has as yet been no more than $5,500 and has been expended in the manner and for the purposes before indicated. We are now, however, without means, and were it not that the individuals employed continue at the labor in the hope that the Government will continue its patronage to its own property, the work of preparation and arrangement would be suspended, as the most the Institution could do from its own funds would be to employ some one to take care of the collection.

The object of the Institution is to "increase and to diffuse knowledge among men." Its time and whatever talent it possesses are faithfully devoted to it. But its members have occupations, private and public, which can not be neglected, and they have not the wealth for voluntary contributions. We are therefore obliged to look

to the Government for aid in funds. In other countries, where, although public spirit may not be, individual wealth is so much greater, no institution of the kind has ever succeeded without Government patronage. How much more necessary, then, is such patronage with us. And the more justifiable and necessary will this patronage appear when the reflection is made that the greater part of the property under our care already belongs to the Government, and that all donations, collections, and purchases by the funds of the Institution must by our constitution eventually take the same course. The Institution is but a curator for the Government, voluntarily bestowing its time and talents to objects which can not fail to increase national fame, to elevate national character, and to promote the design of the great philanthropist to "increase and to diffuse knowledge among men."

We therefore respectfully but confidently address you as directors of the Institution and as heads of the departments under which former appropriations were expended and solicit your efforts to obtain further Government aid.

There are two points to which we are anxious to draw your particular attention. One is an appropriation from Congress for preparing and arranging the Government collection; the other for additional space. The first is absolutely necessary, for, as before remarked, former appropriations are exhausted, and the work must be abandoned if more is not granted. We consider that about $20,000 is required for the active and correct prosecution of the work during the year 1842. More labor must be applied, and more varied talent be employed; and we believe it will not be expected that these requisites are to be obtained without a proper consideration. The committee pledge themselves to a faithful superintendence of the expenditures, and to a faithful account of it.

The second is equally necessary. We want space properly to exhibit the specimens. We acknowledge that our occupation of the half of the room assigned to the Institution is but temporary, and that we must look forward to the period when the whole room will be required for other purposes, and while our occupation is of this character, we are also, and every one must be impressed with the conviction that our arrangements can not assume that scientific and permanent character which will be their ultimate condition. Our present labors must therefore be preliminary to a permanent and scientific arrangement, labors, however, not lost as they would be necessarily under any circumstances. But to execute these properly more space is required, and also the uncontrolled occupation of the whole room. This space is the more necessary from the very preliminary character of present labors, as the room has to be a workshop as well as an exhibition room. We make this request from a thorough conviction of its necessity, and from the belief, if granted, it would not incommode the Patent Office. And to prevent misapprehension, we will take this opportunity to state that from the superintendent of that office the Institution has received those accommodations and facilities which might justly be anticipated from a gentleman of his known urbanity and intelligence.

J. J. ABERT,
A. O. DAYTON,
FRANCIS MARKOE, Jr.,
Committee.

NOTE B,

REPORT UPON THE MATERIALS IN THE INSTITUTE.

By Dr. PICKERING, Dr. DANA, Dr. HALE, and Mr. BRACKENRIDGE.

On the 12th of September last I received the charge of the collections of the National Institute, and the hall was soon after placed at my disposal by an order from *the State* Department. My time has since been chiefly occupied in general plans of

arrangement and accommodation, in reviewing the collections of the exploring expedition that had been already opened, opening those recently received and ticketing and taking an account of them. The larger portion has now been gone through with and deposited in the allotted cases, but not yet rendered intelligible by means of labeling and arrangement. I should expect, however, some branches of the zoölogical collections, not yet unpacked, and a portion of the botanical, yet to arrive. I am not prepared at present to make a full report on the proceeds of the exploring expedition, but have only to offer a few remarks relating generally to the objects under my charge.

The interior arrangement of the hall is not altogether such as I should have originally recommended; but the cases being already completed, it remains only to conform to the plan as far as practicable. By lining the walls with cases there will be sufficient accommodation for the present collections of the Institute, including those of the exploring expedition, and the specimens of American manufactures already within the walls. At the same time there is no provision for future increase in any department, much less for any new objects that may be contemplated. There is no room for a geological series of the United States, for a library, a gallery of the fine arts, etc.

The persons at present employed are:

Mr. Varden, having the immediate supervision of the hall and fixtures.

Mr. Dana, having charge of mineralogy and geology, and also of corals and crustacea.

Mr. Brackenridge, having charge of the greenhouse and all botanical collections.

Messrs. Townsend and Pollard, taxidermists, also having charge of the ornithological department.

Mr. Falconer, carpenter; constantly occupied, etc.

Mr. Campbell, messenger and general assistant.

All have thus far given entire satisfaction.

I am not aware that any increase of force is necessary. There is, however, one department on which, from the destructible nature of the objects, we are unable to bestow the requisite attention. I allude to that of entomology. We have on deposit the extensive and valuable collection of Count Castleman, and should be ashamed to allow it to perish in our hands. The collections, too, of the expedition, though not so extensive as was perhaps expected of us, and in part lost with the *Peacock*, yet it is believed include materials that in competent hands might be the means of eliciting facts worth preservation, and having a wider bearing than may be supposed by those who have not duly weighed the relationships of the different parts of creation. Our gatherings in this branch derive a further consequence from our being able to connect them with the vegetable products of the widely separated islets of the mid-ocean and other unfrequented regions it has been our rare fortune to visit.

The collections in conchology have only in part been opened (viz, up to the time of our leaving the Fiji Islands), and no portion properly arranged and exhibited; neither at the present moment can any space be allowed for this purpose. When fully displayed, it is believed that those interested in this branch of science will not be disappointed as to their extent and value.

For the ornithological department, and the dried skins of other animals, I must refer to the accompanying list; promising, however, that there are besides many interesting specimens in osteology, both of man and the inferior animals.

Of specimens in spirits, brought by the expedition, we number 208 jars, containing insects and minor objects in zoölogy, not less in all than 4,000 different species, and 895 envelopes of larger specimens. These last include about 900 different species of fishes and 200 of reptiles, making a total of 5,100 species in spirits, exclusive of the Crustacea, noted by Mr. Dana.

For the botanical department I must refer to the accompanying extract from a report by Mr. Brackenridge. I inclose also reports on the drawings made during the

cruise of the exploring squadron, by Mr. Drayton, and Agate; on the mineralogical and geological collections, from Mr. Dana; and a paper on the philological department I obtained from Mr. Hale, who happened accidentally to be in town. As Mr. Hale has not enumerated the collections in this latter branch, I will here specify them particularly. The Institute now possesses, exclusive of—

Thirty-six volumes and pamphlets, and a large bundle of newspaper files; historical documents, all printed at Lima and Chili, which may not properly come under this head.

Grammar of the Quichua language, which is still the vernacular in the mining towns of the Peruvian Andes.

Ten tracts in the language of the Society Islands, printed in part at Tahiti.

Eleven tracts in the Samoan language, from the mission press at those islands.

Printed specimens also of the Fiji and New Zealand languages, including New Zealand testament.

Sixty-three volumes and pamphlets in the language of the Sandwich Islands, including the entire translation of the Bible; printed at those islands by the American Mission Press; accompanied also with specimens of engraving by native artists, one of which in particular, viz, a general map of the islands, would do no discredit to the state of the arts at home.

A Japanese book (apparently a religious work) and other writings, believed to be entirely unique in this country.

The originaal Tagala grammar, printed two centuries ago at the Philippines, giving an account of that alphabet, now extinct; the more interesting, as this is one of the most remote points to which the invention of letters appears to have penetrated—before, at least, the modern improvements in navigation.

Nineteen volumes of Malay manuscripts; in all probability the finest collection in existence.

Eleven volumes of Bugis manuscripts. (A note says: "The only font of Bugis type in existence belongs to the American board of missions at Singapore.") The Bugis are very proud of their literature, and are now the most prominent people in the East Indian Archipelago; for the peculiar geographical features of the vast region would seem to preclude the division into nations, which obtains in other parts of the globe.

A Bali grammar. (What follows is derived from other sources than the expedition.)

Leaves from a Bali book, presented by Mr. Thomas H. Gills.

A Siamese book.

Several slabs of hieroglyphics from Central America, by Mr. Rupel, United States consul, Laguayra.

Coptic books, by Mr. Gliddon, late consul at Cairo.

Egyptian antiquities and hieroglyphics, by the same, which are specially worthy of notice, and give a juster idea of the style of the works of that wonderful people than could be acquired from plates. Some of these fragments have long been wanted in this country, and will be looked at with the more interest as the extraordinary and authentic annals disclosed by them become more generally known.

I will not now enter into an account of the implements, arts, and manufactures of the various people we have visited. We flatter ourselves, however, that these will prove not the least important part of the collections. I will refer now only to the interest with which we should look upon some such relics of the tribes who once inhabited our Eastern waters, whose race has disappeared ere its history was written. When posterity shall demand of the present generation, as men of intelligence, some account of these people, what will be forthcoming? It is generally to be feared only that which is written in imperishable stone—a few stone hatchets and arrowheads.

With regard to our Western tribes, better things are to be hoped for, although they have already lost some of their arts and ingenuity from intercourse with civil-

ized man. The collection of implements already within the walls is quite respectable, and the expensive series of their portraits from the War Department may well deserve the term of a national monument.

Some national depository has long been wanted where individuals could place, under the care of Government, any object they may happen to possess, in nature or art, that is rare or instructive, calculated to improve and elevate the mind, or furnish materials for new deductions.

The same observations would apply to a national library. Individuals would hardly think of making donations to the Congressional Library; neither would foreign societies. Yet two of the finest libraries of our country—indeed, so far as their sphere extends, I would term them of a higher grade than the rest—have been got together exclusively by donations. I would not by any means be understood to undervalue the Congressional Library, and the very judicious selections that have been made for it of late years. But, shall we always be content with the love of mere England, herself by no means in the first rank in every branch of knowledge? We look in vain in any part of our country for a full assemblage of French, German, Italian, Swedish, Danish, Spanish, Portuguese, Oriental, or hardly classical literature.

I have omitted to mention that the property of the Institute is at present very much exposed to depredation. From 6 to 9 a. m., and also after 5 p. m. the hall is left entirely unguarded and might be entered with the utmost ease. I would propose that a dog-watch be set over the hall and building, as about other public edifices.

Respectfully submitted.

CHARLES PICKERING,
Curator of the National Institute.

WASHINGTON, *November 22, 1842.*

BOTANICAL DEPARTMENT.

Among the various branches of science which it is the object of the National Institute to encourage, disseminate and exhibit, for the benefit and improvement of mankind, perhaps none claims its attention so much as botany. By the study of this science we learn the uses of trees, shrubs, and plants, whether medicinal, nutritious as food, or useful in the arts. The beneficial effects its study produces on society, or on those who pursue it, by softening down the asperities of our nature, and leading the mind to contemplate objects of a higher order than the mere gratification of ordering amusements—which appears to have been the view taken of it by all civilized nations.

The National Institute through the exploring expedition possesses one of the most extensive and varied botanical collections, from the numerous places which the expedition touched at, that is yet known to have been accumulated during any voyage of similar character. This collection has not yet been arranged or set up according to any particular system, whereby it can be referred to conveniently, but rests in the Institute in maps. Wherever a set of specimens of the whole is classified and arranged systematically there will still remain a great number of duplicates to dispose of to institutions of a similar character, either in exchange or otherwise, as the Institute may think fit.

There is also another point connected with botany to which the scientific world has of late years turned their attention, viz, the geological distribution of plants over the surface of the globe; also the altitude or the heights at which certain tribes appear and disappear. On this point the collection could furnish the best information, as many of the specimens were found at a height of 16,000 feet above the level of the ocean. The herbarium it is proposed to put up in neat bands and arranged in cases after the manner of a library.

The Institute has also come into possession of a collection of rare and highly inter-

esting living plants, brought home also by the expediton, which has since received several additions in return for seeds distributed from the same source; also a few donations of other plants from various quarters. For their preservation a greenhouse 50 feet long, and partitioned into two apartments, has been erected on the lot behind the Patent Office. The number of species in cultivation amounts to 500, and, with duplicates of the same, there are about 1,100 plants in pots, over and above those now coming up from seeds. As it is expected that donations will frequently be made, and as the plants we now have will be increasing in size, the present house by another year will hardly suffice to contain them. The propriety also of having a lot of ground fenced in where these plants could be set out during the summer months, and which could also be used for the raising of ornamental trees, shrubs, and other hardy plants, which may come into the possession of the Institute, is strongly urged. The meagerness of our parterres and shrubberies evidently shows that additions are wanting for ornamental gardening.

It would also be a receptacle for proving all samples of fruits, flowers, and esculents that may from time to time be presented to the Institute, there being, so far as I am aware, no public establishment of the kind in existence in the Union. Officers of our Navy and consuls residing in foreign countries might do a great deal in introducing fruits, vegetables, and flowers; and whenever it is known that such an establishment exists, there is every reason to anticipate donations, where the country in general is to be benefited by such an enlightened and commendable scheme. A nucleus once formed, with a gradual accumulation of stock and a steady perserverance in its support and furtherance, we might, at some not very distant day, vie with the most celebrated establishments of the same kind in Europe. The progress of the benefit to be expected must be, like the undertaking, slow but sure, and the effects will soon become evident to every enlightened citizen.

The following is a list of plants, or number of species in the herbarium, collected at the various places visited by the expedition:

Madeira	300	Low Coral Islands (in all)	27
Cape de Verde Islands	60	Sandwich Islands	883
Brazil	989	Oregon country	1,218
Patagonia (Rio Negro)	150	California	519
Terra del Fuego	220	Manila	381
Chile and Chilean Andes	442	Singapore	80
Peru and Peruvian Andes	820	Mindanao	102
Tahiti	288	Tulu Islands	58
Samoa, or Navigator Islands	457	Mangsi Islands	80
New Holland	789	Cape of Good Hope	330
New Zealand	398	St. Helena	20
Lord Auckland Island	50		
Tongatabu	236	Total number of species	9,674
Fiji Islands	786		

The number of seeds brought and sent home by the expedition amounted to 684 species, the most of which have been sent all over the country. Several cases of live plants were also sent home, of the existence of which there are no traces. The live plants brought home by the squadron amounted to 254 species, and these now form part of the greenhouse collection.

WM. D. BRACKENRIDGE.

NOVEMBER, 1842.

REPORT OF MR. DANA.

The inadequacy of the space in the hall of the Patent Office at present allotted for the departments of geology and mineralogy, becomes daily more obvious, as the extent of our collections is better known. The spacious hall is a noble one for the

purpose to which it is devoted; but so many distinct sciences claim a share of the room, that only a small area can be set apart for any one of them. The collections of the exploring expedition swell out beyond our expectations, and when fully arranged there will be room for little else.

The package of mineral and geological specimens already opened occupy three of the cases in the hall and there are yet 7 or 8 boxes untouched. These expedition collections include suites of specimens from the following countries and islands:

1. Brazil, illustrating especially the deposits of gold and gems in the great mining district of Minas Geraes; also the structure of the countries about Rio Janeiro.

2. Rio Negro, Patagonia, where the extensive Pampas of La Plata, and the Tertiary deposits upon which they rest, afforded us a series of interesting specimens, exhibiting the character of these great prairies of the south, and the salt lakes that abound over them.

3. Orange Bay, Terra del Fuego, where terminates the great chain of the Andes. A species of fossil and the nature of the rock deposits, appear to afford sufficient evidence of the similar and consentaneous origin of this portion of the chain with the Andes of Chile and Peru.

4. Chile, and the Chilean Andes. The mountains were twice ascended by parties from the expedition, and specimens obtained, in addition to the rocks of the coast, and ores from copper mines.

5. Lima and the Peruvian Andes, affording us gold and silver ores. The summit of the Andes was passed by a party of officers, and among their collections is a fossil Ammonite, a large extinct species of shell, obtained at a height of 16,000 feet.

6. Oregon. The collections illustrate the rock formations of Northwest America, including the lignite or coal deposits of the Cowlitz and Frasers River, the sandstones and clay slide occurring at intervals from Puget Sound into California, affording numerous organic remains of shells, echini, fish, etc., and the granites, basaltic rocks, limestones, ores, etc., of the Territory.

7. Upper California.

8. The Sandwich Islands. A region of volcanoes of various ages from the great gulf of Lua Pele, where lakes of liquid fire still boil, to the lofty mountains of the western islands of the group, which in the lapse of time have been so shattered by convulsions and worn by an abrading sea, rains, and running water, that no distinct trace of the vent or vents that ejected the successive layers of basaltic rock. On account of this difference of age in the several parts of the group, we have not only complete collections of modern lavas, but others illustrating the operations of these fires for ages back. The late eruption of June, 1841, is well illustrated by numerous specimens from its lavas or scoria, and from the sandhills and new beach formed as the lavas entered the sea. The tops of the high mountains of Hawaii, each about 14,000 feet in elevation, have also contributed to the collections, through the exertion of the officers of the *Vincennes*, who were long engaged in explorations on this island.

9. Navigator or Samoan Islands, a region of ancient basaltic mountains and extinct craters, some of whose twisted lavas and scoria seemed to be of quite recent origin.

10. Society Islands, of similar structure, but with fewer evidences of modern volcanic action.

11. Fiji Islands, also basaltic and containing some boiling springs.

12. New Zealand, combining the craters, active and extinct, boiling springs and volcanic products of the other Polynesian island, with granite rocks, sandstones, and shales, and deposits of coal.

13. New Holland, the collections from the coal region, including the fossil vegetation and from the subjacent rocks which abound in organic remains, is probably the most extensive that ever left the country.

14. Philippine Islands, a region of granite and talcose rocks, sandstone, shales, and

limestone, with mines of gold, copper, lead, and coal, besides containing one of the largest active volcanoes of the East Indies, and many extinct craters, boiling springs, etc.

15. Sooloo Sea, a region of numberless extinct craters or volcanic mountains and abounding in coral reefs.

16. Singapore.

17. Cape of Good Hope.

18. St. Helena.

19. Cape Verde.

20. Island of Madeira, mostly consisting of basaltic rocks, tufas, or lavas, and remarkable for the grandeur of its mountain scenery and the richness of its vegetation.

21. The South Shetlands, which afford large masses of sal ammoniac.

22. Rocks and earth from the Antarctic land, taken from icebergs in its vicinity—principally granite, basalt, and a red, compact, quartz rock or sandstone.

To these should be added the collection from numerous coral islands, which include not only specimens of dead coral rock, the material of the islands, but also various living corals now growing about their shores. We leave corals for the present, as they require separate remark.

The above will give some idea of the interest that attaches to the expedition collection.

Besides the three cases in the hall, to which I have alluded, two others are all that, with due regard to the other departments, can be set apart for the sciences of geology and mineralogy. There are already large collections of minerals waiting to be arranged, to which Col. Totten has generously added his entire cabinet. The collection which accompanied the Smithsonian bequest has been often noticed, and we pass it by without further remark at present than to testify to the beauty and interest of its specimens. In addition, there are twenty-seven boxes from the Iowa territory, inclosing specimens from the lead and copper mines, and others elucidating its general geological structure, collected by the able geologist of that region, Mr. D. D. Owen. A fine suite of Ohio fossils has been received from Mr. Locke, of Cincinnati, comprising numerous species of trilobites. A rare collection of bones of mammoth size, the remains of a megatherium, an extinct animal, was lately obtained at Skiddaway Isle, Georgia, and by the liberty of Dr. S—, of Savannah, are now in the hall. Other packages have been received from M. C. Buck, Wm. A. Irvin, Robert Brown, Capt. R. Latimore, D. A. Buckley, of Jacksonville, Ill.; Fr. Marcoe, jr., of Washington; J. M. Allen, of Albany; M. Stony, of Vermont; Martin Johnson, Mr. Ziegler, Joseph Willett, of Maryland; J. I. Greenough, Prof. U. Parsons, Mr. Mecklin, of Maryland; G. R. Gliddon, consul in Egypt; W. L. Ames, of New Jersey; Dr. J. H. Caustin, C. D. Barton, of New York City; Wm. M. Mitchell, of Virginia; Dr. Lewis Sayinsch, and O. Root, esq., of Syracuse, N. Y. Specimens are constantly arriving, and now, after the late circulars issued by the several departments of Government to our military and naval officers and consuls, they may be expected in still greater numbers.

After arranging the expedition specimens, there will be one case and a part of another for all the mineral collection, the Iowa geological specimens, and the many others in our possession. With the exception of the minerals, for which there is scant room, the whole must remain closed.

The importance of these sciences, and the interest of the country in its mineral resources, make it desirable that some plan like the following should be adopted, and as soon as may be carried into execution: There should be a complete collection of minerals, systematically arranged, comprising specimens from all countries, and illustrating fully every branch of the science. For geology, in the collections of which are included rock specimens, fossils, soils, and whatever may illustrate the formation of our globe, the changes in its progress, its present condition, and min-

eral or agricultural resources, I would suggest that in addition to cases for foreign geology, there be a special case set aside for each State in the Union, to contain specimens of all its productions, mineralogical and geological. This plan carried out, a single walk through the hall would convey the information of years of travel; the mineral wealth of each State would be open for inspection, and the nature of their productions and their comparative value might at once be read off. Those interested in coal explorations would find here the rocks which contain this mineral and indicate its presence; and near by those rocks also which by some resemblance have so often led to fruitless explorations; the true and the false might be readily compared, and with the definite information obtained, treatises on this subject, before scarcely intelligible, be read with profit. The same, with the ores of iron, copper, lead, gold, silver, etc., and the various materials used in building, soils, etc.

Such an arrangement, embracing within its plan every part of our country, will enlist exertions as widely extended; and we may confidently believe that the titles New York, Pennsylvania, Virginia, etc., inscribed on the respective cases, would not long stand over empty shelves. Indeed, for some States a second and a third case might soon be required. The Iowa case could now be filled, and a commencement might be made with the case for New York, that for Ohio, Virginia, Maryland, Pennsylvania, Rhode Island, and New Jersey. As geological surveys are in progress in many States, or have been completed, there will be little difficulty in general in obtaining complete suites for the National Institute. The corals in the hall, with few exceptions, were received from the exploring expedition. The collection is extensive and possesses peculiar interest inasmuch as the species are mostly from seas that have seldom contributed to the cabinets of this or any country. The various cruises of the vessels among the numerous Pacific islands afforded unusual opportunities for the collection and examination of these singular forms of animal life, and much that is new has been brought to light with regard to the structure of coral islands, the growth of corals, the nature and forms of the animals that deposit them (of which a large collection of drawings has been made), besides discovering many new species and correcting some errors in former descriptions. The number of species brought home is not less than 250, and if to this be added the smaller corrallines it will amount to above 350, besides species of still inferior grade of organization, the sponges. The corals now occupy two cases which are barely sufficient to receive them. A separate case of West India corals might soon be filled, as we may expect large collections through the exertions of the officers of the Navy cruising in those seas. It would be quite important that these productions from the opposite sides of our globe, the East and West Indies, be kept separate.

The beauty of these collections is sufficient of itself, as is believed, to engage the attention and more than a passing glance or hasty word of admiration. But their interest is greatly enhanced when it is considered that thousands of square miles of land have been added to our globe by the labors of the minute coral-builder, and that seas have been studded with islands that otherwise would have remained a waste of waters.

Before closing this communication I may add a word on the Crustacea in the Hall, which department fell into my hands in the expedition and comes under my charge also at the Institute. The collection now arranged includes about 650 species, nearly all of which are from the exploring expedition. The whole number of species collected and examined during our cruise is not far from 1,000, more than half as many as the whole number known. Of these, 500 and upwards have been figured; and not less than 450 out of the 500 are new species, besides many others in the collection not yet particularly examined. About 250 species are oceanic and belong to genera of which not over 30 species are known, affording, as is thus seen, a great number of novelties to be brought out in the publications of the expedition. The most of these oceanic species are microscopic, generally less than a tenth of an inch in length. Although so minute, they sometimes swarm in such numbers as to give a red tinge

to the ocean over large areas. While at Valparaiso, the sea for miles to the southward appeared as if tinged with blood, owing to the myriads of these minute Crustacea. Some species are so transparent that, under the microscope, all the processes of vital action, the motion of every shell in the complex organization of animal life is open to view, exhibiting many novel facts, curious and important to the physiologist.

The arrangement of the expedition specimens may be completed in the space that we now occupy, but the addition of such American and foreign specimens as will gradually collect around this nucleus will finally extend the collection over double the present area.

Very respectfully,

JAMES D. DANA.

NOVEMBER, 1842.

DEPARTMENT OF PHILOLOGY AND ETHNOGRAPHY.

One of the sciences which have of late years attracted an increasing attention, and one which from its subject would seem to claim a peculiar regard, is what may be termed the natural history of the human race, or as some have named it, anthropology. It divides itself naturally into various branches, possessing distinct names of interest, and requiring different methods of study. One of them, and that perhaps to which the Institute will be able to contribute most largely, treats of the manners and customs of the various nations and tribes of mankind, as indicating the character and the grade of civilization which is to be ascribed to them. Travelers in Egypt inform us that, from the representations of objects and views pictured on the monuments of that country, one may obtain a clear and probably accurate idea of the mode of life of the ancient inhabitants and can there form a better conception of their national characteristics than from all the works of historians. The natives of most countries, particularly those less advanced in civilization, possess no monuments of this kind, which may be copied or transported into our midst, like those of Egypt. But one may have the very implements and manufactures which those pictures would represent, the canoe and net of the fisherman, the bow and javelin of the hunter, the spear and club, the helmet and buckler with which the warrior went out to meet his enemy; we may have the clothing, the domestic utensils, the ornaments for the dance—in short, enough to show the state of the arts, the daily habits, and the ideas of comfort and prosperity among particular people. Among the collections of the exploring expedition deposited with the Institute will be found nearly all the articles of native manufacture in use among two tribes of distinct races, the New Hollanders and the Fijians; those of the former number about a dozen, while the latter yield several hundreds. A single glance at the two collections will give a clearer idea of the wide difference existing between these tribes than any description.

In tracing the migrations of a people and the connections of distant branches, the comparison of arts and social habits may, if pursued with caution, be an important guide. A person knowing nothing of our language or history, who should visit the United States, after having traveled in Europe, would have little doubt from which country of the latter our ancestors proceeded. The islands of the Pacific are peopled by two distinct races, the one having a yellowish brown complexion, with flowing hair; the other one a dusky skin, frizzled or wooly hair, and features approaching the African type. There is not in the climate or nature of the islands which they respectively inhabit any reason why their habits and mental characteristics should differ. Yet we find that the art of pottery and the use of the bow are common to all the islanders of the latter or dark-skinned race, without exception, while they are entirely unknown to the former, except where they have been acquired in late times from the other. We must, therefore, presume that these arts were brought by the dusky tribes who possess them from the original seat whence they

have emigrated. These observations will show that the articles of this description preserved by the Institute are not to be regarded merely as amusing toys or as objects of idle curiosity, but possess an important scientific value.

Another department of this study relates to the physical varieties of the human race. In stature, in complexion, in the nature of the hair and the shape of the cranium the differences that prevail between various tribes are very striking. Some have supposed it possible to classify all these varieties under these principal divisions or races, while others have believed them to be so numerous and to fade into one another by such insensible gradations as to set all classifications at defiance. Still there can be no doubt that every distinct people possesses a peculiar cast of countenance and style of complexion and feature, what is commonly called a national physiognomy, and that separate tribes and nations, descended from the same stock, preserve in their physical characteristics the traces of their common origin.

Knowing, as we do, that the influence of climate and manner of life is powerful in modifying the constitution and personal appearance of those subjected to it, a question of the highest importance arises as to the extent to which this modifying power may be effected. Some have supposed that all the peculiarities which distinguish the varieties of mankind have had their origin in this influence of climate and social habits, while others have considered the power much more limited, and maintain that these peculiarities have existed unchanged as they were originally stamped on the progenitors of the different races. These opposite views are supported at the present day by writers of the highest authority, and as the question is evidently one to be settled not by reasoning so much as by observation, every fact bearing on this point merits to be recorded. The Institute possesses a small collection of crania, obtained by the exploring expedition, which will afford some useful results, and the series of Indian portraits due to the War Department may be considered, in this report, invaluable.

A division of this study is comparative philology in the science of languages. Speech has been called the first and highest development of human reason; it is also the clue by which we trace more evenly than by any other means the affiliation of tribes and the relationship which exists between different nations. By the comparison of languages we can prove that nearly all the nations of Europe—whether of Celtic or Latin or German or Sclavonic origin—are not only closely allied one to another, but belong to the same stock with the inhabitants of Persia and Hindustan. By the same means we ascertain that a race of Malay origin has peopled all the islands of Polynesia. Modern philologists have discovered that the natives of America, from the Arctic Sea to Cape Horn, speak languages which, though dissimilar in words, possess a striking grammatical resemblance—like different metals cast in the same mold.

In the pursuit of this interesting study, the importance of obtaining vocabularies of the languages spoken by secluded or newly discovered tribes is easily seen. Manuscript works in language of which little is known, are also of great value for the investigation of their grammatical structures, and the collection of East Indian manuscripts brought home by the exploring expedition may be signaled as possessing unusual interest. The Institute is not less indebted to Mr. Stevens for the monumental slabs from Central America, covered with those remarkable hieroglyphics, which are now awaiting the appearance of some new Champollion to unfold their mysterious purport.

In search of these departments of ethnographical science, all persons whose pursuits bring them in contact with many varieties of one kind, and in particular the officers of the Navy of foreign stations, have an opportunity by obtaining and transmitting articles of native workmanship—crania or mummies of particular tribes, and vocabularies or manuscript of languages little known—to add materials to the general stock, which may hereafter be of invaluable service to the scientific investigator.

H. HALE.

NOVEMBER, 1842.

OUTLINES OF THE ETHNOGRAPHICAL COLLECTIONS, CHIEFLY FROM THE EXPLORING EXPEDITION.

NEW HOLLAND.

Buckles, or small narrow shields.
Boomerangs, the singular missile, often described.
Waddies or clubs.
The throwing-stick, adjutant for throwing javelins.
Beads or wampum, made of the stem of a grass, etc.

FEEJEE ISLANDS.

War clubs of various patterns, and the small war clubs used as a missile.
Bows and arrows, slings.
Spears, both for war and fishing.
Wooden idols, oracles, headdress of priest, sacred cava cup, etc.
Wigs, combs, turbans, etc.
Paterns or cava bowls, dishes, etc.
Matting, and baskets of various patterns.
Pottery—water vessels and for cooking.
Musical instruments, consisting of Pandean pipes, nose flutes, war conch, and drum.
Mosquito nets, fans, fly brushes, wooden pillows.
Stone adzes.
Fishing nets and lines, cordage, etc.
Dresses for females, of various, and some brilliant colors.
Armlets and necklaces in great variety, neck ornaments, head bands.
Tapa, or cloth, also of great variety of patterns in the stained figures.

SAMOA ISLANDS AND TONJATABU.

These islands, in common with the other Polynesians, have evidently derived their arts mostly from the Feejees. Their implements as we recede become less numerous, with often much diversity in the model. I note only:
Arrows for catching pigeons, of the Samoa Islands.
Models of the single canoe.
Models, large, double Tonja canoe, used for distant sea voyages.
Rasps of shark's skin, for working wood, common to many Polynesian islands.

TAHITI.

We obtained very few things at Thaiti, where native implements are becoming rare. We saw no weapons of the original stamps.

SANDWICH ISLANDS.

The same remarks apply in a good measure to this group. Native ingenuity disappears when brought in contact with civilized man—and with a knowledge of money, the bark-beaten cloth of the South Seas gives place to calico at 10 cents a yard. We obtain here, however, more extensive collections. I mention only—
The large calabashes, used as baskets to carry burdens, and found so convenient by all travelers.
Tapa, in imitation of European patterns.
Models of canoe.
Feather ornaments—the yellow is the favorite color here.

MARQUESAS ISLANDS.

Specimens of the ingenious carving of these islanders, procured many years ago, were presented by Mr. Demester.

LOW OR POMOTEE ARCHIPELAGO.

These lonely coral reefs present attractions only for this amphibious race of people. Implements of the same pattern with other Polynesian, but much ruder. There is no longer any stone for hatchets, and a piece of shell is substituted, while a crooked root serves for a handle. There is no bark suitable for making cloth or tapa, and their clothing consists exclusively of matting.

PENRHYNS ISLAND.

The same remarks will apply to Penrhyns Island, with its wild and impetuous inhabitants, but being covered with cocoanut trees, it is much more populous, and the implements obtained show neater workmanship.

NEW ZEALAND.

Still Polynesian, but much variation in the style of their manufactures and ornamental carving. Their cloaks, made of New Zealand flax, a beautiful article.

Neck ornaments of green-colored stone or jade. The thin, slender club, or wooden sword (used with both hands), almost their only weapon prior to the introduction of firearms, etc.

KINGSMILL ISLANDS.

A remarkable change in most things from the Polynesians. Long, pronged spears set with shark's teeth; as likewise swords of different lengths. Woven coats of mail and cuirasses for protection. A porcupine fish for a cap. Natural fishhooks of crooked roots, etc. A very large and interesting collection of the implements of these coral islands was lost in the *Peacock*.

EAST INDIES.

Models of Malay proas.

Krisses or seymetars, spears and shield, battle-axes, musical instruments.

TERRA DEL FUEGO.

The collection is nearly complete, though the articles are so few in number.

Bows and arrows, the latter singularly enough the most beautiful we have met with—flint head.

Bone-headed fish-spears, likewise bearing a stony analogy to those of our Northern Indians.

Seal-skin quivers, slings, paddles, and necklaces.

PERU.

Our collection of antiquities is quite respectable; pottery, cloth, nets, plastering, etc., from the ancient graves. I must also particularize the headdress of "the last of the Incas," presented by Mr. Sweetzer.

OREGON AND NORTHWESTERN COAST.

Our collections here were full.

Paddles, models of canoes, etc., some of former ornamented with different colors.

Carved combs, the conical, woven, and painted hat (the same pattern is used throughout East India).

Bows and arrows, the heads of bone, flint, and now iron almost their only weapon, except now knives.

Various grotesque wooden masks.

Dice, made of beaver's teeth, wooden decoy-duck.

Model of cradle showing the mode of flattening the cranium, for which the Chenooks are so famous.

Model of fastening child to a board and carrying on horse-back.

Pipes of wood and bone, imitating steamboat, houses, and other fashions of civilization.

Stone pipes, representing grotesque figures of original pattern.

Carved stone saucers, some well worthy the attention of those who think genius only the offspring of civilization.

Ornaments of dentalium shells; snow-shoes.

Blankets and belts, of native weaving.

Feather blankets.

Cloaks of vegetable fiber; much after the New Zealand pattern.

Leather or buckskin dresses, moccasins, belts, etc.

Beautiful membrane cloaks, and baidare (covered skin canoes) of farther North.

CALIFORNIA.

A race of different origin is seenin the different style of manufactures, ornaments, and woven baskets for carrying water and cooking; others richly ornamented with feathers, plumes, ear ornaments, bead work.

Bows and arrows of the usual American pattern; war spears headed with bone.

Feather dress for a sort of priest or devil.

The arrow-proof cuirass and hemispherical cap of the Shasty Indians.

C. PICKERING.

NOVEMBER, 1842.

REPORT UPON THE DRAWINGS MADE BY MESSRS. DRAYTON AND AGATE.

Through the labors of the artists, Messrs. Drayton and Agate, in connection with the literary and scientific duties of the other officers, the journals of the expedition are of two kinds—the written and the pictorial, and although the former is necessarily the more complete, yet the latter in consequence of the industry of those gentlemen and the large number and faithfulness of the sketches made, would of itself give a very thorough account of the islands and races we have seen; and in many respects far more detailed and satisfactory than is possible with the pen. The scenery of the islands, their mountains and forests, their villages, with interior and exterior views of the huts or houses of both chiefs and common people, spirit houses or temples, war implements, fortifications, household utensils, tools, canoes, the natives sitting in council, dressed and painted for war, the domestic scenes of the village, costumes, tatooing, modes of cooking, eating, drinking cava, taking and curing fish, swimming, gambling and other amusements, war dances, club dances, jugglery, and numerous other particulars illustrating the modes of life, habits, and customs of the various tribes inhabiting the islands or countries visited, have been sketched with fidelity. Indeed nothing escaped their pencil when time was allowed, and the series of sketches when finished—for many were necessarily left in outline—will be more instructive and interesting than the highest literary abilities could render the journal of the voyage. One picture by Mr. Agate, representing a temple on a newly discovered island, and the cocoanut grove about it, containing one ride, three or four naked savages starting in affright from an officer that is just beginning to puff a cigar, and is pouring the volumes of smoke from his mouth, the impression of such a scene can not be conveyed in words, nor the idea it gives of the ignorance and superstition of the savage. The portraits are numerous, and are not merely

general sketches, but accurate likenesses of particular individuals—so faithful, indeed, although but the work of a few minutes in the hands of our skilful artists, that the natives would cry out with surprise the name of the individual when a sketch was shown them.

Besides historical and ethnographical drawings, the sketches of objects in natural history are very numerous; and they embrace all departments of natural science, including some geological sketches. The variety and beauty of marine animals in the coral seas of the Pacific are beyond description. Like birds in our forests, fish of rich colors and strange forms sport among the coral groves; and various mollusca—animals low in the scale of organization—cover the bottom with living flowers. A new world of beings is here opened to an inhabitant of our cold climate, and many of these productions are so unlike the ordinary forms of life that, but for our eyes, we could scarcely believe in their existence. Many of them are among the most brilliant and beautiful objects drawn and colored by Mr. Drayton. Among the geological sketches by Mr. Drayton the representations of the great crater of Lua Pele, especially the night scenes of its boiling lakes of lava, are highly valuable. There is probably no volcano in the world where the processes of volcanic actions are more laid open to view, and on this account these sketches are very unlike the ordinary pictures of a burning mountain, and far more interesting to the geologists. Scarcely less interesting than these volcanic scenes are the views taken among the Andes of Peru and Chili.

The following list gives more particularly the number of drawings in the several departments. The whole number of distinct objects or scenes delineated is 2,100. Of these 200 are portraits, 180 plants, 75 reptiles, 260 fish, 850 mollusca, and over 500 landscapes and historical sketches. The drawings of crustacea, corals, birds, and quadrupeds were mostly by the naturalists in charge of these departments, and are not here enumerated.

The sketches, to which we have referred, have been made in the following different regions, and they have been the more or less complete according to the length of time spent at these places. It should be observed that the several groups of islands in the Pacific, although not far distant from one another, have each marked peculiarities in the physiognomy, dress, domestic manners, etc., of their inhabitants.

(1) Madeira, (2) Cape Verde, (3) Rio de Janeiro, (4) Rio Negro, Patagonia, (5) Terra del Fuego, (6) Chile, (7) Peru, (8) several islands of the Low Archipelago, (9) Society Islands, (10) Navigator Islands, (11) New Zealand, (12) New Holland, (13) Tonga Tabu, (14) Fiji Islands, (15) Kingsmill Islands, (16) Sandwich Islands, (17) Oregon Territory, (18) Philippine Islands, (19) Sooloo Sea, (20) Singapore, (21) Cape Town, (22) St. Helena—besides some small scattered islands in the Pacific unnoticed in this enumeration. Of these places, the pictorial account of the Fiji and Sandwich Islands and Oregon Territory is the most full.

The drawings, as has been remarked, are not finished. To complete them on the spot would have been impracticable where so many things equally important were demanding immediate attention, and had it been attempted the sketches could not have exceeded one-fourth their present number. They are so far complete, however, that they might in a short time be finished up by the artists.

In addition to sketching, Mr. Drayton has written down the music of the natives at many of the islands, and the note or tones which the different nations employ in speaking.

On nearing land the artists were besides employed in drawing headlands, and of them there are nearly 500 in addition to the other sketches.

DRIED PREPARATIONS IN NATIONAL INSTITUTE—NOVEMBER 18, 1842.

Catalogue, showing the number of birds, quadrupeds, reptiles, fishes, etc.—Prepared in the rooms of the National Institute.

	Specimens.	
Birds from the exploring expedition	471	
Birds from South America and other foreign parts	86	
Birds presented by the Jardin du Roi, Paris	87	
Birds of North America	276	
		920
Quadrupeds from the exploring expedition	26	
Quadrupeds from United States and other parts	49	
		75
Reptiles from the exploring expedition, etc	66	
Fishes from the exploring expedition, etc	48	
		114
		1,109

There remain probably three hundred bird skins to be set up, brought by the exploring expedition; and about twenty quadrupeds, some of large size. This is exclusive of an immense number of duplicate specimens.

C. P.

NOTE C.

REMARKS SUBMITTED TO THE HON. MR. WALKER BY MR. MARKOE AND COL. ABERT.

In conformity with the desire you expressed that we should put on paper the substance of our conversation with you on certain matters connected with the Institute, we submit the following to your consideration:

There are several points which, to our experience and reflections, are essential to the prosperity of the Institute and to the great objects for which it was chartered. These are:

(1) That the Institute should be the organ of the Government in the arrangement and preservation of the collections and in the supervision of the appropriations which the Government may make for those purposes.

(2) That the Institute should have the power of disposing of all duplicates by a system of exchanges with other institutes, or with States, or with individuals.

As all the Government collections are placed under the care of the Institute and as all the collections which have been made, or will hereafter be made, by the Institute, must, by its charter, eventually become the property of the Government, the necessity of a harmonious and intimate intercourse between the Institute and the Government seems, to our judgment, self-evident. This idea is clearly maintained in the charter of the Institute, which makes the six heads of the different Goverment Departments six of its directors.

But the nominal charge which the Institute now has of the collections amounts to nothing, and the same may be said of the very slight and extremely indirect influence which it has been allowed to exercise over the Government expenditures for the preservation and arrangement of the collections. At present there are three controlling or operating powers over these subjects: First, the Library Committee of Congress; second, the Navy Department; and third, the Institute. But this last, its influence is so slight, if it can be said to have any, that it would be too much to say it is either felt or acknowledged. Such a divided state of control can

not fail to operate injuriously upon persons employed and upon their duties, as it is difficult to say who is their head, who shall direct or superintend their operations, or who shall decide upon the propriety of expenditures, and to whom they are accountable.

It is clear, to our judgment, that the desired and necessary control can not well be exercised by the Library Committee. This committee can not be considered as present, upon an average, for more than six months of each year; and when present the legislative functions of its members must occupy each greater part of their time and minds.* It is equally clear that these powers can not be well exercised by the Navy Department. In addition to its other various and highly important duties, there is no kindred occupation in any of its interesting functions which would give to it the means of judging of the proper occupation of the persons employed upon the collections, or of the propriety or appropriateness of any expenditure which may be made; nor can it devote the time requisite to superintend either occupations or expenditures. Under such circumstances surprise should not be created if disappointment were to be experienced in reference to anticipated results from Government patronage. The Institute, as before remarked, possessing neither influence nor authority, can exercise no control; and although it may, as a consequence, be free from responsibility, it can not, in our opinion, be exempt from serious anxieties, nor from that moral responsibility which the country already attaches to it from its charter and from a general impression of the power it is supposed to possess. And yet it seems to us that the Institute is the most suitable agent for such purposes. It is always present; the very intuition of its organization was to promote matters of science, to arrange and preserve specimens of natural history, and to advise on subjects connected therewith. It ought to be supposed that the Institute possesses among its members competent knowledge for such duties and that it has all the devotion and zeal and exclusiveness of feeling which the well-being of matters of science requires. During the period when the Institute exercised more influence than now its vigilant vice-president was daily in his rooms, and for hours, advising and directing, to the great benefit of its management and to the prevention of many an injudicious expenditure.

In addition to these considerations, the organization of the Institute renders it peculiarly deserving of the confidence of Government, as it can offer, as an agent for Government property and Government expenditures, a board of its own officers.

The officers of the Institute consist of a president, vice-president, two secretaries, one treasurer, and twelve directors. Six of these twelve directors are the heads of Government Departments, namely, the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Attorney-General, and the Postmaster-General. These are directors *ex officio*, and constitute the Departments through which all Government expenditures are made. Six others are elected by the Institute from among its members. These six at present are the honorable Mr. Woodbury, the honorable Mr. Preston, Mr. Dayton, Fourth Auditor, Commodore Warrinton, of the Navy, Col. Totten, of the Corps of Engineers, and Col. Abert, of the Corps of Topographical Engineers.†

These are the whole of those who are recognized by the charter as "officers of the Institute," and constitute by the charter "a board of management for the fiscal concerns of the Institute."

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* This committee also expires on the 4th of every other March, and in consequence it can exercise no control, either directly or indirectly, until after the election of a new committee at the ensuing December session of Congress.

† Since this paper was written a new election of directors has taken place, namely, on the 25th January, 1843, when the honorable Mr. Walker was chosen in the place of the honorable Mr. Preston, who could no longer attend, and Commodore Maury, of the Navy, was chosen in the place of Commodore Warrington, who was unwilling to serve.

The whole board consists of seventeen, five of which are the officers named, six are the heads of the Government Departments, *ex-officio* directors, and six are elected annually from the body of members. Now, as it is hardly within the verge of possibility, that the offices of president, vice-president, secretaries, and treasurer of the Institute will be filled by any other men of known fitness and good character, so is it impossible that eleven (adding the six *ex-officio* directors), a majority of the board, can fail to deserve the fullest confidence of the Government. Then if we look to the six elected directors and reflect for a moment upon the palpable and decided interests of the Institute and upon the vocations of its members, it is a probability so remote that it may be considered an impossibility that a great majority of this board of managers can ever be other than persons deserving of confidence, holding important public places and in the employ of the Government.

Now, then, if the Government were to place the control of its collections and of the appropriations for arranging and preserving them under this board of management it would be placing its property and funds where all its other property and funds are placed, namely, under its own officers and under accustomed and long established responsibilities. But these officers are also officers of the Institute; therefore to place this property under that board would also be to place it under the Institute.

Upon this plan the Institute would be made to fulfill the objects of its organization, the most appropriate organ would be selected by the Government, and the Government would, in the persons of its own officers, retain its just control over its own property.

If it should be said that this board of management can be controlled by directors of the Institute, the answer is easy. It would be worse than idle for the Institute to come in conflict with the Government or hazard a loss of its confidence, and it is not fair to suppose, against all experience, that the small portion of common sense necessary to avoid such a consequence would not be possessed by the Institute or that it would be unmindful of its own palpable interests.

Moreover, if this board of management should be required to lay a statement of its proceedings annually before Congress, it would be held to the established responsibility of the different Government Departments, and be subject, like them, to have its course and conduct investigated and corrected.

Such a plan would also preserve that union between the Government and the Institute collections so desirable and so essential to the prosperity of both.

It has been intimated to us that there was a desire to separate these and to form a distinction between the exploring squadron and the Institute collections. A course more fatal to the prosperity of both collections and to the great objects for which the Institute was chartered could not well have been imagined.

All the collections in the care of the Institute, from whatever sources received, are either now the property of the Government or must by our charter eventually become so. They are the results of various donations from foreign ministers and consuls abroad; from foreign institutions and foreign governments; donations from domestic institutions and from citizens of our own country; donations from officers of our Army and Navy, the results of the official circulars from the War and Navy Departments; and deposits from individuals and from the different departments at Washington. Let the opinion once get abroad that contributions from the various sources are not to receive from the protecting hand of the Government that attention which their preservation and arrangement require; let it once be supposed that all these are to be neglected and those only of the exploring squadron to be cared for, and the consequence will soon be felt by the degenerating of the collection from a great and increasing storehouse of all that our own and other countries can furnish to that of a small museum, forever limited to the results of the exploring expedition.

Far be it from our intention, by these remarks, to undervalue the collection from

the squadron. We are too sensible of its excellence and too conscious of the aid it has been to the Institute to entertain any such idea, and we fully and most highly appreciate the intelligent labor and industry of its collectors. But its specimens neither exhaust our admiration or our wants, nor render us insensible to the highly valuable and continually increasing supplies from other sources, nor relieve us from the conviction that upon other sources we must principally rely, if our desire be to extend the collection to a point worthy of the national character or of comparison with similar institutions in other countries.

In justice to the Institute it should also be borne in mind that, but for its efforts, these very specimens from the exploring squadron would have been scattered, we know not where; and but for those efforts the scientific describer might have searched in vain for a specimen upon which to found a description or to prove a discovery. It is to the Institute, chiefly, that those who gathered these specimens are indebted for the present collected results of their great industry and intelligence.

Second. The next matter which we desire to bring to your notice is the right of disposing of duplicate specimens. Our efforts to exchange have been paralyzed for the want of this right. The institute is now seriously indebted to foreign governments, to foreign and domestic institutions, and to individuals, on the principle of exchanges, because the Institute has not the right to dispose of specimens, although its cases are loaded with duplicates. The collections of the Government being placed in the Institute on deposite, the committee upon exchanges have not felt themselves at liberty to use a specimen. We have heard, with extreme regret, that it is contemplated to give all duplicates back to the collectors. Such a course, in our opinion, would be ruinous in the extreme, as it would destroy one of the great means of increasing the collection by a system of exchanges. And as these collectors were amply paid for their labors, we can see no reason for such a course in justice or equity. Nor can we believe that such a course is desired by the scientific corps of the expedition, for, while other men of science are daily making collections, at their own expense, and sending them to the Institute, many as presents, some in expectation of exchanges, it would place the gentlemen of this corps low in the scale of contributors to science if, after having been so long and so liberally paid for their labors, they should yet desire the result of these labors to be given back to them. Moreover, we have understood that by far the greater number of these specimens were actually bought by the collectors from funds furnished by the United States. We can see, therefore, no reason whatever that they should be returned unless the Government is disposed to abandon all idea of forming an enlarged scientific and interesting National Museum.

From our remarks, then, it will appear that, in our judgment, there are serious defects in the present condition of affairs which required to be remedied: one, in the absence of a responsible and adequate supervision of the arrangement and preservation of the collections and of the persons and expenditures in reference thereto; the other, in the absence of authority to dispose of duplicates. These defects can be properly remedied only by legislative provision.

We desire it to be distinctly understood that our reasoning has no reference to the publication of the results of the voyage, but is limited solely to the preservation, arrangement, and exhibition of the collections. We think, however, that the Institute might be able also to give acceptable opinions, even in reference to the publication—its form and style of execution. But as there is an anxiety to possess this power by others, and as it is already placed elsewhere, we do not seek to interfere with it, not doubting that in all its parts it will equal similar publications by other governments and justify the anticipations which are now entertained of it by the learned world.

Having thus expressed our general views on these several subjects, we will conclude by an effort to condense them in a manner that will admit of their being incorporated in a law.

This law should, in our opinion, contain provisions investing—

(1) The Board of Managers of the National Institute with the custody of all the Government collections which have been received or which may hereafter be received from the exploring squadron or other sources, with authority to make all necessary arrangements to preserve or exhibit the same, to regulate, under the supervision of the President of the United States, the number and compensations of persons employed on said duties, and to superintend the public disbursements in relation thereto.

(2) To authorize the said board to exchange any of the duplicates of said collections with other institutions, or with State collections, or with individuals, and to require the board annually to lay before the President of the United States, to be by him laid before Congress, a full account of their proceedings under this law.

(3) To direct the said board to furnish to the persons who shall be employed in the writing or publication of the voyage and discoveries of the exploring squadron all desired facilities.

[Copied from original draft of Col. Abert.]

NOTE D.

WASHINGTON, *March 10, 1845.*

Hon. ROBERT J. WALKER,

United States Senator:

DEAR SIR: We beg leave to call your attention to Senate Document No. 233, of the 28th ultimo, being a report made by the Hon. Mr. Tappan, as from the joint Committee of Congress on the Library, to which had been referred "A bill for the preservation of the collection of natural curiosities furnished by the exploring squadron, and from other sources," together with "remarks submitted by Mr. Markoe and Col. Abert."

The "remarks" to which the report refers were made, as you will recollect, and, as is distinctly stated in the first paragraph of them, at your request, were intended to satisfy your mind of the propriety of the measure we wished you to befriend, and were addressed to you not only as the well-known friend and advocate of the Institute, but also as the chairman of one of its important committees, and as a director and consequently member of the Board of Management. They passed into the hands of the committee, of which Mr. Tappan is a member, without any desire on our part, and without our knowledge (certainly, however, with no unwillingness that they should be read by the whole world), and, under these circumstances, we respectfully submit to you whether the attack upon us by the honorable Senator has not been as unprovoked as a reference to our remarks will prove it to have been unmerited.

We can not suppose, as Mr. Tappan supposes, that you had not read our "Remarks" before you laid them before the Library Committee, therefore take it for granted that you did not perceive the "direct insult" to the committee which is so palpable to Mr. Tappan, or you would not have consented to be the medium through which the insult was conveyed. On the contrary, we have every reason to suppose that you had made yourself perfectly acquainted with the character and scope of "our remarks"—remarks hastily put together, and meant to afford limits and memoranda for your consideration and use, to illustrate the necessity or advantage of the measure recommended. They were certainly not intended or calculated to give offense in any quarter. We will therefore occupy your time by pointing to two paragraphs, only, of the "Report," which we quote in answer to two serious allegations made against us by the honorable Senator. You will judge whether they have any just foundation.

Mr. Tappan says: "The case presents two officers of the Government, one at the

head of a bureau, the other a clerk in one of the public offices, who ask as a matter of right, that they should have the supervision of a very important literary and scientific work, the publication of which Congress has thought proper to entrust to one of its regular committees."

We must deny that any such case is presented, or that it can be inferred from our "remarks." Our "remarks" on this subject were as follows: "We desire it to be distinctly understood that our reasoning has no reference to the publication of the results of the voyage, but is limited solely to the preservation, arrangement, and exhibition of the collections. We think, however, that the Institute might be able to give acceptable opinions even in reference to the publication, its form, and style of execution. But as there is an anxiety to possess this power by others, and as it is already placed elsewhere, we do not seek to interfere with it, not doubting that in all its parts it will equal similar publications of other governments, and justify the anticipations that are now entertained of it by the learned world."

You are well aware that there are appropriations of two distinct characters in respect to the exploring squadron, and the publication of its results (the Hon. Mr. Tappan does not appear to be aware of this, in our judgement, to have kept this distinction in his mind): one for the publication of the history of the voyage, the narrative and scientific descriptions; the other for the preparation, preservation, and exhibition of the collections. It is the latter one that we have ever manifested a desire to see placed under control of the Institute, which it appears to us is a most suitable agent for such purposes, and the more particularly as these collections had been placed by the Executive under its care.

The other allegation against us by Mr. Tappan is, in our opinion, equally incorrect. He says: "But the great point with Messrs. Abert and Markoe seems to be to get hold of the appropriations made by Congress to enable the committee to execute the law."

The law to which Mr. Tappan refers relates to the publication of the proceedings of the expedition; the remarks made by us relate to a system for the preservation and exhibition of the collections.

Our remarks on this head were, "that the Institute should be the organ of the Government in the arrangement and preservation of its collections, and in the supervision of the appropriations which the Government may make for those purposes." We speak of the Institute, of which we are merely members, and of the "Board of Management," of which we are but two out of seventeen. To this "Board of Management" we think the power appropriately belongs, and in its hands we hope yet to see placed the management of whatever relates to the arrangement, preservation, and exhibition of the collections. It is clear to us that no better arrangement could be made with the superintendence of the publication and in the appropriation which belongs to it (duties assigned to the Exp'l. Exp'm Committee by law) we have not expressed a desire to interfere, and forbear, as we have forborne, to make any remarks upon them—except to express the hope that the wishes and opinions of the naturalists themselves will be consulted and their opinions be allowed a proper weight.

Our "remarks" in continuation of the above quotation were: "The organization of the Institute renders it peculiarly deserving of the confidence of the Government, as it can offer as an agent for Government property and Government expenditures a board of its own officers."

"The officers of the Institute consist of a president, vice-president, two secretaries, one treasurer, and twelve directors—six of these twelve directors are the heads of the Government Departments, namely, the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Attorney-General, and the Postmaster-General. These are directors, *ex officio*, and constitute the Departments through which all Government expenditures are made. Six others are elected by the Institute, from amongst its members. These six at present are

the Hon. Mr Woodbury, the Hon. Mr. Preston, Mr. Dayton, Fourth Auditor, Commodre Warrington, Col. Totten, of the Corps of Engineers, and Col. Abert, of the Corps of Topographical Engineers."

"These are the whole of those who are recognized by the charter as 'officers of the Institute,' and constitute by the charter, 'A Board of Management of the fiscal concerns of the Institute.'"

The quotations speak for themselves, and we will trouble you with but few more remarks. Mr. Tappan, in the beginning of his report, most truly says that, "The remarks of Messrs. Markoe and Abert are not to be considered as the act of the National Institute." The "remarks" neither purport nor pretend to be the act of the Institute. And moreover we beg leave further to say that neither are Messrs. Abert and Markoe the "Board of Management for the fiscal concerns of the Institute" under the supervision of which they suggested the expediency of placing the appropriations which Government might make for the arrangement and preservation of its collections.

It also seems to have given offense to the honorable gentlemen, that we should have proposed in our remarks "to furnish to the persons who shall be employed in the writing or publication of the voyage and discoveries of the exploring squadron all desired facilities." We really are at a loss to perceive the offensive matter in this sentence. It has no allusion to the Library Committee, for they were neither to write nor to publish. The law invested them with power to enter into contract for the publication and each member of the scientific corps of the squadron would, we presume, be required to furnish the narrative of his observations. The persons therefore employed in the "writing or publication of the voyage" were these scientific men and the contractors. If furnished with all desired facilities it would be all they ought to have, all they could want, and if furnished by the Institute there would be some agent responsible for the specimens and interested in seeing that they were returned after being taken out of the building by either the describer, the engraver, or the publisher. The Library Committee expired on the 4th of March, and there will be no committee until after a new election of the next Congress. We believe the committee can not appoint an agent to have a longer existence than itself; hence appeared in our judgment the propriety that the Institute should be invested with the care of the collection.

Had the honorable Senator published our "remarks" with his "report," as was due in all fairness, this letter would have been unnecessary, for the "remarks" contain in our opinion ample refutation of the errors of the "report." We deem it wholly unnecessary, also, to point out to you other inconsistencies and mistakes into which the honorable Senator has fallen, and which have been, on his motion, published in his report to the Senate.

We rather limit ourselves, in conclusion, to soliciting your advice as to the best mode of correcting the erroneous impressions which the language of the Senator is calculated to make upon the public.

We remain, dear sir, with great esteem and respect, your most obedient servants.

LETTER FROM THE HON. MR. PRESTON TO COL. ABERT AND MR. MARKOE.

COLUMBIA, S. C., *April, 1843.*

MY DEAR SIR: Having had ample occasion to witness the devotion which you and Col. Abert have manifested to the National Institute, you may imagine the surprise and mortification with which I have seen the total misconception of your motives and conduct in regard to it in Mr. Tappan's report to the Senate. To the unwearied and enthusiastic exertions of yourselves and a few other gentlemen, animated, as it seemed to me, by nothing but a pure love of science, that institution was mainly indebted for its origin and the eminent success which has attended it from the be-

ginning. I can say with entire certainty that my own interest in it was stimulated and sustained by you, and that I was continually made ashamed of how little I felt and how little I did when I saw the unabated zeal and unrecompensed labor which you bestowed upon it. While I wished well to the Institute from a conviction that it would promote the advancement of science, you and he particularly devoted yourselves to it with that deep enthusiasm which a more intimate knowledge can alone excite, and upon which all scientific projects must depend for their success. Men in public station or the munificent rich may contribute the means, but the vital principle of all such institutions is found in the hearts of those who are willing to work night and day, and whose labor is a labor of love. I was deeply impressed that the Institute had found in you and Col. Abert precisely such agents, and my high hopes of its ultimate success arose from the fact that it had found such. I by no means mean to say that there are not associated with you other gentlemen equally impelled by as earnest and disinterested motives, but this I will say, that a vast deal of the labor was thrown upon you two, and that, to my mind, the discretion and wisdom of the Institute was evinced in the selection of such agents. I speak of Col. Abert and yourself especially because you and he are made the subject of a most unmerited attack.

It is with great pleasure that I bear this testimony in your behalf. If I had been in the Senate when the report was made I think I would have been able to satisfy Mr. Tappan of the mistake into which he had fallen, but at all events I would have put upon record my opinion of the purity of purpose and the wisdom of the plans which have characterized the conduct of Col. Abert and yourself throughout.

I am entirely satisfied that if the Government collection derived from the exploring expedition, or from any other source, be not to a great extent subject to the control of a scientific association, or of men animated by a philosophic spirit, which spirit alone brings them to the task, it will not increase and will be dilapidated. Our Government is peculiarly incapable of a proper superintendence of scientific institutes. In the first place it may be said that it has no constitutional power, and if it had, the tenure of office is so liable to change, that in a department so removed from interests of intense excitement, negligence and decay would soon creep in. It therefore seems to me from the beginning that accessions to science, incidentally made, like the collections of the exploring expedition, should be deposited for arrangement, preservation, and exhibition with such a society as the National Institute, the Government retaining the property while the Institute has the use of it, or rather while the Institution makes it useful to the public. Without some such arrangement the Government will find that its valuable specimens will be lost or molder away in forgotten boxes, or become a mere mass of rubbish.

I am persuaded that Mr. Tappan, upon such explanations as you and other gentlemen in Washington can give him will perceive the injustice of his remarks. He has an earnest love of science and literal learning of all sorts, and without some obvious misconception cannot fail to sympathize and coöperate with gentlemen who with such singleness of purpose and such broad intelligence as yourself and others of our friends of the Institute have at heart the same objects with himself.

I am, my dear sir, your obedient servant,

WM. C. PRESTON.

FRANCES MARKOE, jr., esq.

SPRINGWELLS (NEAR DETROIT), *May 18, 1843.*

Col. J. J. ABERT:

DEAR SIR: I have read with much interest, but not without some pain, the pamphlet you had the goodness to send me. I regret that anything should have occurred unpleasant to you, and especially in any matter in which the Library Committee should have participated. I do not remember the day when "the remarks" of yourself and Mr. Markoe were submitted in the Senate by Mr. Walker and referred; but my impression *is that by reason of accident* or delay in some of the officers of the

Senate they did not reach the committee until more than a week after they were referred; and when taken up in committee the session had approached very nearly its termination. I do not remember whether when so taken up they were read *in extenso;* but the "bill" which accompanied them was read and its principle discussed. The committee was, I believe, unanimous in its opinion that it was not expedient to pass the bill; if at any time, certainly not until the Library Committee should have fully executed and terminated the trust committed to it by law. Very much inconvenience and embarrassment had already grown out of a confliction of an alleged power of control and direction, especially in relation to the "specimens of natural history," etc., collected, and in respect to which it has been made the duty of the Library Committee to cause to be prepared the appropriate publications.

Great responsibility must grow out of the execution of those powers, for a wide discretion must of necessity be exercised. Without expressing any opinion as to what disposition should finally—and after the powers of the committee in the matter shall have ceased—be made of those rare, rich, and beautiful materials, it remained the undivided opinion of the members of the committee, I believe, that while those powers and correlative duties existed it was necessary that those materials should continue in the entire control of the committee.

This conclusion being come to, the whole subject of the bill, "remarks," etc., was committed to Mr. Tappan, as a subcommittee, with directions to prepare and make report accordingly.

After this last measure was adopted in committee, I believe the committee did not meet again; but it was certainly understood that Mr. Tappan should report to the Senate this result.

Without respect to the doubt which had been raised as to whether all the powers of the Library Committee continued after the 3d of March, I hazard nothing, I believe, in saying that in analogy to the case of certain officers of Congress, those powers were believed by the committee (on which, as you are aware, there were some professional gentlemen of very high standing) to continue during the recess, and it was in corroboration of that opinion asserted that always since the foundation of the Government the same construction had been put upon the Constitution and the powers of Congress. In conformity with that view, I have been required, as chairman of the joint committee, to draw, in the name of that committee, upon the funds subject to its order for sums of money for books, salaries, compensations, etc., since the close of its last session. How else could the law be executed or justice be done?

I trouble you with this long detail, my dear sir, because of the personal esteem and respect which, I beg leave to say, I entertain for you individually, and because I very sincerely regret that anything should have occurred in this matter tending to wound your feelings or to give you pain.

As chairman of that most highly respected committee whose proceedings have been the subject of comment, it may perhaps be esteemed indelicate in me to have made this exposition without its previous sanction. Please, therefore, consider this letter as intended for yourself alone.

I remain, with sincere respect, yours,

WM. WOODBRIDGE.

NOTE E.

JANUARY 21, 1845.

SIR: I have the honor of transmitting to you the memorial of the National Institute, drawn up in pursuance of a resolution of the Institute of the 10th of December. And in further obedience to the resolution, I have to request that you will do the Institute the favor of presenting the memorial to the consideration of the Senate and House of Representatives.

The papers herewith, and which constitute the memorial are:

(1) The memorial as directed by the resolution.

(2) The resolution under which the committee acted.

(3) The memorial of the scientific men at their meeting in Washington during last April.

(4) The memorial of the Institute of March, 1844.

J. J. ABERT.

Hon. MR. WOODBRIDGE,
United States Senate.
Hon. J. Q. ADAMS,
House of Representatives.

I.

MEMORIAL OF THE NATIONAL INSTITUTE.

To the honorable, the Senate and House of Representatives of the United States of America in Congress assembled:

The undersigned, a committee appointed for the purpose of preparing a memorial on behalf of the National Institute, to be accompanied by copies of memorials which were presented to your honorable body during the last session, beg leave to submit to your consideration the annexed copies of said memorials and to invoke the friendly views of your honorable body, to the prayer therein contained.

An examination of the character of the by-laws and of the proceedings of the National Institute will show that among the principal objects of its organization are those of forming, at the seat of the General Government an extensive museum of the natural history of our country in all branches, and affording every possible facility for the development of mind in its devotion to the sciences and the useful arts. But the experience of a few years of our existence has satisfied the Institute that individual means are inadequate to meet the expenses involved in the exhibition and preservation of its already extensive and continually increasing collection and for paying the transportation charges of valuable donations daily arriving from all parts of the world.

These collections, valuable and extensive as they are, have been obtained comparatively without cost, and will evidently go without cost to the United States, as by the conditions of our charter the Institute, in reference to all its collections, is in reality a trustee for the United States.

Its position and national character have enlisted the most enthusiastic feeling in its favor from the institutions and the enlightened men of all countries, evinced and daily evincing itself, by presents of the most valuable literary works, and by donations of specimens of natural history and the fine arts. It is to preserve and exhibit these and to pay for their transportation, which exceed our ability and for which, on behalf of the National Institute, we solicit the aid of your honorable body on the grounds of our position in the District of Columbia, of the national character of our organization and action, and the consideration that all the property and collections of the Institute must by our charter eventually become the property and collections of the Government.

The Institute will readily acquiesce in any restrictions and safeguard with which your honorable body think proper to protect any aid that may be granted, only begging leave to call the attention of your honorable body to the safeguard already established in our charter, which makes the six heads of the principal departments of the Government directors of the *ex-officio* board of managers of the Institute.

J. J. ABERT, *Chairman*,
I. L. SULLIVAN,
T. SEWALL, M. D.,
M. THOMAS, M. D.,
W. W. LEATON,
I. C. BENET,
Committee.

JANUARY 21, 1845.

II.

At a meeting of the National Institute, held December 9, 1844, the corresponding secretary (Mr. Markoe) offered the following resolution, which was, on motion, unanimously adopted:

"*Resolved*, That a committee of six persons be appointed by the chair to prepare a memorial to Congress in behalf of the National Institute, to be accompanied by a copy of the memorials which were presented at the last session; and that the committee request the Hon. Levi Woodbury to present it to the Senate, and the Hon. John Quincy Adams to present it to the House of Representatives, at the present session."

Whereupon, the chair appointed the following gentlemen to constitute the committee: Col. J. J. Abert, John T. Sullivan, Dr. Sewall, Dr. Thomas, Messrs. Seaton, and J. C. Brent.

[Proc. Nat. Inst., I, 374.]

III.

MEMORIAL OF THE FRIENDS OF SCIENCE WHO ATTENDED THE APRIL MEETING OF THE NATIONAL INSTITUTE.

To the Congress of the United States—The respectful memorial of the friends of science, assembled at the City of Washington, from various parts of the Union.

The undersigned have come together at the capital of the United States, at the call of the National Institute for the Promotion of Science, with the purpose of communicating to each other the facts and reasonings in science which each one's research might have suggested, and of interchanging views and opinions in regard to the progress of science in our country.

While engrossed in this delightful and most profitable communion, we have had an opportunity to observe the results of the efforts made by the members of the National Institute for the advancement of science. Founded only four years since, they have already brought together valuable collections in natural history and in the arts. Connecting themselves with the Government, through the heads of departments, who, by virtue of their offices, are directors of the Institute, they have voluntarily imposed restraints upon the operations of the Institute, which will preserve its national character, and prevent its being tributary to any local or sectional purpose. By making the Institute merely a trustee for the United States of the property which it possesses, and may hereafter acquire, they have proved that no sordid or interested views guided them in framing their constitution. The zeal and industry shown in making collections, the disinterestedness in the disposition of them, would seem to deserve from the Government of the Republic approval and encouragement. The value of the property already collected, although the existence of the Institute has been so short, is very great. And yet it has no building for the convenient exhibition of its treasures, or even for their safe keeping. And if articles of so much interest and value have already been collected, what may not be expected from the Army, the Navy, and friends of science generally, in the long reach of years to come, if a suitable place can be provided for their preservation and exhibition. But how are the means of providing such a building to be obtained? If attained at all for such a purpose by voluntary contributions, it could only be in the midst of large and flourishing communities. Local feelings of interest or pride can not be transferred, and it is not to be expected that the means to arrange, display, preserve, and augment these collections can be procured by voluntary contributions of individuals in the District of Columbia, or that they can be procured out of the District. There is no civilized nation, however narrow its policy in other respects, which does not exhibit some measure of interest in promoting the advancement of human knowledge. In most countries science receives direct encouragement, and many governments have vied with each other in their efforts to advance this cause. The government of a country emulous to consider itself among the first of enlightened nations, *we trust, will not* refuse to aid in securing to its capital the benefits of the labors of

the National Institute. We cordially unite with the resident members of the Institute in asking an appropriation in its behalf from Congress. Our only fear is that in thus requesting aid for the keeping of what in fact is the property of the Government, we may be considered as asking a boon far below that which the country calls for, and that we ought to urge upon the National Legislature a liberal and plenteous endowment for a National Institute; and we are only withheld from doing so by considerations growing out of the present financial condition of the Government. But that which we ask is so entirely within the means of Congress, and the urgency of its application to preserve what has been accumulated, with so much labor and expense, is so great, that we can not but hope the enlightened and intelligent members of Congress will distinguish the present session by the necessary appropriation of funds to an ob'ect so truly national and so truly republican.

ELIPHALET NOTT, *President Union College, Schenectady.*
BENJAMIN F. BUTLER, *New York.*
A. H. EVERETT, *President Jefferson College, Louisiana.*
JAMES TALLMADGE, *President University of New York, and President American Institute, New York.*
JOHN W. DRAPER, *Professor Chemistry, University of New York.*
W. W. MATHER, *Professor Natural Sciences, Ohio University, Athens, Ohio.*
L. R. WILLIAMS, *Professor Natural Philosophy and Chemistry, Jefferson College.*
C. GILL, *Professor Mathematics, St. Paul's College, Flushing, N. Y.*
JOHN W. DUNBAR, M. D., *Professor, University Maryland.*
W. A. NORTON, *Professor Mathematics and Natural Philosophy, Delaware College, Easton, Pa.*
JOHN W. YEOMANS, *President Lafayette College, Pa.*
JOHN W. LOCKE, *Professor Chemistry, Medical College, Ohio.*
HENRY R. SCHOOLCRAFT, *Delegate New York Historical Society.*
W. R. ABBOTT, *President Georgetown Library Association.*
GRAFTON TYLER, M. D., *Georgetown, D. C.*
RICHARD S. MCCULLOH, *Professor Mathematics and Natural Philosophy, Jefferson College, Maryland.*
JOHN ELGAR, *Montgomery County, Md.*
FRANCIS J. GRUND, *Philadelphia.*
A. D. CHALONER, M. D., *Philadelphia.*
S. C. DONALDSON, *Baltimore, Md.*
JAMES CURLEY, *Professor, Georgetown College.*
ALEXIS CASWELL, *Professor, Brown University, Rhode Island.*
JAMES P. ESPY.
EDWARD A. COOK, *New York.*
A. TALCOTT, *Connecticut.*
WM. STRICKLAND, *Philadelphia.*
BENJAMIN HALLOWELL, *Maryland.*
HECTOR HUMPHREYS, *President St. John's College, Annapolis, Md.*
GEORGE TUCKER, *Professor, University of Virginia.*
JAMES PRENTISS, *New York.*
RICHARD PETERS, *Philadelphia.*
R. M. PATTERSON, *Philadelphia.*
SAMUEL HAZARD, *Philadelphia.*
ELIAS LOOMIS, *Professor, Western Reserve College, Ohio.*
CHARLES D. CLEVELAND, *Philadelphia.*
SAMUEL F. B. MORSE, *New York.*
RICHARD RUSH, *Philadelphia.*
EDWARD HITCHCOCK, *Professor, Amherst College, Massachusetts.*

WASHINGTON, D. C., *April, 1844.*
[Proc. Nat. Inst., I, 385.]

IV.

MEMORIAL OF THE NATIONAL INSTITUTE.

To the honorable the Senate and House of Representatives of the United States of America:

The memorial and petition of the "National Institute for the Promotion of Science and the Arts," respectfully represent:

That its members have been induced, by a high sense of the duty to the body whose interests they represent, as well as to the great objects which it was the design of its creation to promote, to submit to the consideration of your honorable bodies a statement of the origin and progress, of the past and present condition, and of the wants and exigencies of the Institute.

The Congress of the Union, after a full investigation of the subject, after duly estimating the value and importance of the design of its founders, and the means which it contemplated to employ in the accomplishment of those ends, deemed them so far entitled to its countenance and favor as to grant to the Institute a charter of incorporation. Some pecuniary aid incidentally followed, and it was made the custodian of much valuable property belonging to the Government. This charter, whose date is recent, naturally afforded the hope of national protection, thus inspiring everywhere confidence the moment it was seen, by the acts of Government, that confidence was felt at home.

Under these auspices the National Institute began its career. Many of the most distinguished and illustrious individuals in the nation afforded it their aid and encouragement.

Its active members were chiefly composed of officers of Government and citizens of Washington, who, occupied in their own private concerns, neither men of wealth nor mere scholars, proposed to give a portion of their leisure to promote objects in which they had no other or ulterior motives and interest than such as were common to the nation, and, perhaps, to the whole human family.

These individuals have so far advanced with a success which they could little have anticipated, and they now approach the legislature of the Union, and the nation at large, with the fruits of their labors in their hands, spreading before those whose interests they have undertaken to advance the results which in so brief a space of time they have accomplished, asking that their deeds should be examined and compared with their promises; and if they have performed their duty faithfully, and discharged the trusts confided to them honorably, zealously, and successfully, that they may be encouraged by the only reward they have ever sought, viz., the means of enlarging and giving additional efficiency to their patriotic efforts and purposes. They appear before your honorable bodies to render an account of their stewardship, and they solicit an examination of their proceedings.

In urging this matter upon Congress, it is not the design of your memorialists to present a formal argument to establish either the constitutional authority of your honorable bodies to confer upon the National Institute that pecuniary aid which they so urgently need, or the expediency of so applying any portion of the public patronage. They believe that Congress is fully competent to the ascertainment and decision of all questions of this character. While, therefore, your memorialists abstain from entering into any discussion of conititutional questions, submitting, with the most respectful deference, to the judgment of your honorable bodies, they feel that they are in no manner trenching upon this ground in exhibiting fully and distinctly those facts and circumstances which will furnish the general data upon which Congress is to decide.

The National Institute is composed of private individuals, with no other bond of connection than their common labors as trustees of certain property for the public and the Government—a common feeling of interest in promoting scientific and useful information, and the bond of union bestowed upon them by Congress in their charter

of incorporation. In effecting the designs of their association, they have established an extensive correspondence with influential and useful men—men of experience, of letters, and of distinguished scientific attainments, not only throughout the Union, but throughout the world. In every part of Europe and of the American continent, in Asia, and in Africa, we find generous and enthusiastic friends and corresponding members. Foreign Governments have evinced their interest by valuable contributions, and many of the most distinguished institutions and societies abroad are correspondents and contributors. An aggregate amount of munificence, zeal, learning, and adventitious advantage is thus possessed by the Institute, which has already yielded substantial results, and holds out assurances of the richest fruits. In further illustration of the advantages which are here imperfectly sketched, we submit for the examination of your honorable bodies a communication lately received from Paris, with accompanying documents and transactions, exhibiting, in a remarkable manner and degree, evidences of interest and good will towards Congress, towards the States, and towards the Institute on the part of the Government and people of France.

Through this widespread instrumentality the Institute has labored to form an extensive library and museum, or collection of objects of natural history, a repertorium of facts and contributions to science, documents illustrating history in general, but in an emphatic manner that of our own continent, and specimens of the fine arts, of mechanic ingenuity, valuable productions of the vegetable kingdom, and materials illustrating the moral and social condition of nations generally, but in a more especial manner of our own. From every quarter of the globe valuable and various contributions have been transmitted to us. The gallant officers of our Army and Navy, the diplomatic and consular representatives of the Government abroad, the men of learning and science every where have entered with the most praiseworthy zeal in the cause, and vied with each other in the number and value of their contributions.

The collection thus made is not designed for, or appropriated to, the exclusive use of the Institute, or of any particular class of individuals. It is opened gratuitously and daily to the inspection and for the benefit of all. Without cost, the student of natural history may here find ample means of improvement in that department of science to which his attention has been directed; without cost, the geologist and mineralogist are furnished with abundant materials for prosecuting their researches; the curious may indulge their predilections, while the man of science is enabled to peruse the valuable contributions from learned societies and individuals throughout the world.

In addition to these meterials, thus accumulated by the labors of the Institute itself, the convenience of the Government has made it the depository and guardian of numerous articles of its own property, which are thus exhibited to the public eye without trouble to the ordinary officers in the various departments, and without the consequent abstraction of their time from more peculiar and appropriate duties. The interesting collections of Indian portraits and curiosities formerly deposited in the War Department; the objects of curiosity, and various donations to the Government or to distinguished citizens from foreign countries, once in the State Department, are here shown to the public in connection with much other public property.

The articles arising from these, and from various other sources which it would be tedious to enumerate, already in the custody of the Institute, are of great value, and they are increasing with rapidity, and accumulating to an indefinite extent.

The real owners of these treasures are the Government and the nation. The individual members of the Institute contemplated no interest or property in them, beside their trust for the public, beyond what is enjoyed by every citizen in the land, or, indeed, every stranger who may feel disposed to use them as a means of indulging a liberal curiosity, or gratifying his love of science. Such of the articles as at any time belonged to the Government remain its absolute and exclusive property. They

are simply intrusted to the Institute for safe-keeping and public exhibition, and may be withdrawn whenever it shall suit the wishes of the owners to dispose of them in any other manner. The donations by individuals and public bodies to the Institute are substantially in the same predicament. So long as this corporate association exists it has the charge, custody, and control of it, as trustee for the Government; but upon the dissolution of the Institute, the entire mass becomes equally, as the other branch of the collection, the absolute and exclusive property of the nation. In the mean time, the members wish for no private interest in the collection, and if the present charter be not susceptible of the construction that the whole beneficial interest of all the articles is now, as well as at its close, in the Government, they are anxious to have an amendment made to accompany the appropriation asked for, which shall, at once, regulate the property in that way; for the Institute has depended on the Government heretofore, and must continue to rely on it, not only for many of the most valuable articles in its possession, but for a place to deposit them, and a place for their meetings, as well as for some of the means to defray the incidental expenses of opening, putting up, and preserving their collections. In short, all the property belongs to the Government. The guardians of it, under the charter, are chiefly the officers of the Government. The custody of such property was heretofore at the public expense. And that such sums should still be expended by Congress as would pay for the freight and other expenditures connected with it, would be the exercise of no other power than such as has been exercised by the Government every year since its organization.

The individuals who compose the Institute, have, by their pecuniary contributions and specific donations, largely aided in augmenting the value of this property, in arranging it so as to render it available, and in defraying the expenses necessarily attending the execution of the important and responsible trusts confided to them. They have thus created, enlarged, and rendered practically useful the property of the Government and of the nation. Their means of usefulness, their capacity to extend the benefits of the museum, are limited only by their capacity to meet their daily expenses.

Not only are the Government and the nation the absolute owners of much of the property of the Institute and the beneficiary owners of the residue, but they are also the exclusive recipients of the advantage to result from the entire enterprise. At this period of the world, and in this enlightened age, it is not necessary to present an argument to establish a truth which all history inculcates, that the highest glory of a nation, the purest and most durable happiness of a commonweath, rest most upon a moral and intellectual advancement.

If, in the legitimate execution of those powers which by the Constitution are vested in your honorable bodies, collateral results should follow, by which science and literature shall be fostered and encouraged among your constituents, and diffused more widely through our Union, such consequences will not, we presume, furnish grounds of objection to the rightful exercise of power in the breast of any individual. It is believed that few are disposed to controvert the lawfulness, while a still smaller number will deny the expediency, of the appropriations heretofore made by Congress to the literary and benevolent associations of this District and city. None can doubt the lawfulness of those provisions which have been from time to time made for the protection of the property of the nation and its adequate security and care by the erection of suitable buildings for its accommodation, and furnishing proper compensation to the officers or agents of the Government charged with its preservation and improvement.

All the Institute asks of Congress then, is an appropriation of a sum sufficient to discharge the arrears of expense heretofore incurred and due by the Institute, an annual appropriation for the necessary purposes of the association, and the continuance of the indulgence hitherto granted of the use of convenient rooms for preserving the property and holding the ordinary meetings.

Annexed to this memorial are various documents, of which the following is a list:

(1) Charter of Incorporation.

(2) Constitution and By-Laws.

(3) Abstract of Proceedings, comprising the contributions, donations, and deposits made to the cabinet and library of the Institution since its foundation, with the names of the contributors, donors, and depositors.

(4) List of officers, and honorary, resident, paying corresponding, and corresponding members, and of the societies, institutions, etc., at home and abroad, in correspondence with the National Institute.

PETER FORCE, *Vice-President.*
FRANCIS MARKOE, JR., *Corresponding Secretary.*
JOHN K. TOWNSEND, *Recording Secretary.*
GEORGE W. RIGGS, JR., *Treasurer.*
JOHN C. SPENCER,
JOHN NELSON,
WILLIAM WILKINS,
C. A. WICKLIFFE,
Directors, ex-officio, on the part of the Government.
LEVI WOODBURY,
R. J. WALKER,
J. J. ABERT,
JOSEPH G. TOTTEN,
A. O. DAYTON,
M. F. MAURY,
Directors on the part of the National Institute.

WASHINGTON CITY, *March 18, 1844.*

[Proc. Nat. Inst., I, p. 382.]

NOTE F.

MEMORIAL TO CONGRESS.

The following appeal was made to Congress at its late session (first session of Twenty-ninth Congress) in favor of the National Institute, and was presented to the Senate by the Hon. Lewis Cass and to the House of Representatives by the Hon. John Quincy Adams:

To the Senate and House of Representatives in Congress assembled:

The undersigned would respectfully petition that the memorials* heretofore presented to your honorable bodies in behalf of the National Institute may again be taken into consideration and the prayers therein be granted.

In addition to the reasons before set forth in their favor, the undersigned would beg leave to state what they most sincerely deplore—the increasing difficulties of the Institute. It is becoming entirely impracticable, by mere private contributions and taxes, to pay the large incidental expenses attendant on the collection and preservation of so much valuable property connected with the advancement of science, literature, and the arts. The Institute asks and has asked nothing for the private emolument of its members. It merely seeks means to secure the property coming into its custody from time to time so that it may not be injured or lost, and so that it may be exhibited and used by the public, as it is dedicated to the public, and the title to it is intended to be in the Government.

For want of pecuniary means, all our collections, whether in possession or increasing by new additions weekly, are in jeopardy; and unless Congress interfere to save

* Copies of these memorials will be found at pp. 383 and 386 of the Third Bulletin of the proceedings of the National Institute, which accompanies this memorial.

what is so public in its character, and so peculiarly under its guardianship as is the encouragement of matters of this kind within this District, subject to its exclusive legislation, the prospect is that the operations of the Institute must of necessity cease and the property be abandoned.

Deprecating, as we do, an event so unfortunate for the cause of science and the arts, not only here, but from here in some degree over the whole Union, and not a little disreputable to our character abroad, the undersigned would earnestly pray that Congress, at an early date, may avert the calamity by taking steps to aid efficiently in preserving this important public property; and the more especially do we ask this, when, for various reasons, it can be done at moderate expense and in entire conformity to the provisions of the Constitution.

The undersigned respectfully refer to the documents annexed, which exhibit the character of the Institute and the course of its proceedings.

LEVI WOODBURY, *President*,
PETER FORCE, *Vice-President*,
FRANCIS MARKOE, JR., *Corresponding Secretary*,
G. W. RIGGS, JR., *Treasurer*,
ROBERT J. WALKER, *Secretary of the Treasury*,
J. J. ABERT, *Topographical Engineers*,
J. G. TOTTEN, *Engineer Corps*,
M. F. MAURY, *U. S. Navy*,
A. O. DAYTON, *Fourth Auditor*,
Directors.

WASHINGTON, *December 16, 1845.*

LIST OF DOCUMENTS ACCOMPANYING THE ABOVE MEMORIAL.

First Bulletin of the Proceedings of the National Institution for the Promotion of Science, established at Washington, 1840: Washington, 1841.

Second Bulletin, etc., March, 1841, to February, 1842: Washington, 1842.

Third Bulletin, etc., February, 1842, to February, 1845; also proceedings of the meeting of April, 1844: Washington, 1845.

ETHNOLOGICAL COLLECTIONS IN THE U. S. NATIONAL MUSEUM FROM KILIMA-NJARO, EAST AFRICA.

By Dr. W. L. Abbott.

A little south of the equator, and about 175 miles from the coast of East Africa, rises the splendid mountain Kilima-Njaro. It covers an area as great as the Bernese Oberland, and its cratered peak, Kibo, is over 20,000 feet in height, capped with glaciers and eternal snows.

For centuries there had been reports among the coast people of a great snow-covered mountain in the interior, but it was not until 1849, when Krapf, a missionary, first saw Kilima-Njaro, that the Suaheli statements were verified.

The nearest port on the coast is Mombasa, now the headquarters of the British East African Company. The country between is an open plain and scrub-covered desert, excepting where the Teita Hills rise, about 100 miles from the coast, to a height of 3,000 feet. In the plain, close to its southeastern corner, lies the forest arcadia of Taveta, the porters' paradise, offering a cool and shady resting-place after the scorching journey from Mombasa.

The mountain is volcanic, with two cones, Kibo and Kimawenzi. The former is the highest, 20,100 feet, and contains a huge crater 2,000 meters in diameter and 200 meters deep. A secondary cone rises from the floor of the crater, and the whole is covered with an ice-cap of glacier. Kimawenzi is a black dome of rotten lava, about 700 meters lower, and is rarely completely snow-covered. A connecting ridge about 15,000 feet in height joins the two peaks, which are situated about eight miles apart. The axis of the mountain lies east and west.

None of the early explorers gained any considerable elevation. Charles New reached nearly 14,000 feet in 1872. Joseph Thomson reached about 8,500 feet; then H. H. Johnston, in 1884, claimed to have reached about 16,000; Count Teleki, in 1887, did reach this altitude. Immediately after Dr. Hans Meyer, of Leipzig, accompanied by Baron von Eberstein, got to the foot of the glacial ice-cap, but they were unable to ascend its icy precipices. Last year Lieut. Ehlers and the writer attempted the north face of Kibo; Ehlers gained the northwest corner without seeing any crater, however, and the writer broke down at

17,000 feet. Finally, the past autumn, Dr. Meyer, accompanied by Herr Purtscheller, of Salzburg, an experienced Alpinist, succeeded in making four ascents of Kibo and two of Kimawenzi. The ascents were extremely difficult, owing to the rotten condition of the ice upon Kibo, the explorers often sinking to their armpits. Kimawenzi was still worse, with its precipices of crumbling lava, great masses being detached at a touch. The great crater in Kibo was discovered and the mountain accurately mapped.

The climate of such a mountain, of course, presents every variation. The surrounding plain has an average elevation of 2,500 feet. Ascending from its tropical temperature and vegetation, we enter the more temperate zone of Chaga, at a little over 3,000 feet. This is the inhabited region and extends to about 5,400 feet; then comes a zone of heavy forest, reaching, with some intervals of grassy downs, to about 9,000 feet. Some scattered patches of forest are found 1,500 feet higher. The region of grass and heather reaches to 14,000; above this, saxifrages, mosses, and lichens to about 15,500, when all vegetation ceases and the ground is covered with glacial débris. The line of perpetual snow is about 18,000 feet. The southern slope is well watered and the rainfall heavy, owing to the southwestern monsoons. Many rivers flow down it, cross the plain to the southward, and empty into the Ruvu. The eastern slope is also well supplied with rain. Its streams, however, do not reach the foot; but among the foothills, a short distance from the base, are a number of springs of clear, cold water. These form two rivers. One, the Useri, flowing northeast, empties into the Sabaki; the other, the Lumi, flows southward, giving life to the forest of Taveta, and, after forming a large backwater (Lake Jipe), receives other streams from the mountain and becomes the Ruvu, emptying into the sea at Pangani.

The northern and western slopes are much drier, the streams are few, and the vegetation much more scanty. Here, also, the forest zone exists, but is much narrower, and there are some small openings through it, by which the buffalo and eland and other denizens of the plain travel up to the higher regions. But, instead of the populous and well-cultivated zone of Chaga upon the other slopes, here we find only a wandering and pastoral population of Masai, comparatively few in numbers, still further diminished during the past few months by their disastrous war with the Arusha Wajun.

Upon the slopes of Kilima-Njaro, and in the plains near by, are numerous extinct cones and craters, mostly of small size. One at the southeast corner forms the crater lake of Chala, a lovely sheet of water about 1½ miles in diameter.

The lava walls rise perpendicularly 200 feet from the water's edge. It is inhabited by numerous crocodiles and a peculiar species of fish.

The scenery of Kilima-Njaro and the neighborhood can scarcely be compared with that of any place in Europe or America, it is so entirely

different. The distances are so great that the effect of the great heights and mountain masses are to an extent lost. The neighboring mountains, although often of giant size, rise blue in the distance. Westward is the volcanic pyramid of Meru, scarcely known by name, yet not far from 18,000 feet high, containing a huge crater and secondary cone, which, as seen from a high point upon Kilima-Njaro, is always white with snow. Other neighbors are the Ugweno, Pare, Litema, Ngaserai, and the volcanic masses of the Kyulu mountains; all these higher than the Jura and some of greater extent, their very names scarcely as yet known in Europe. From here, in Moshi, Kibo, and Kimawenzi are each distant about 15 miles and of course do not look very imposing. But the scene in some of the gorges and ravines near the bases of the peaks is wild and grand to an extreme. One gorge near the base of Kima-

Fig. 1.

MT. KILIMA-NJARO, EAST AFRICA.

(From photograph in U. S. N. M.)

wenzi is very fine, rugged bare walls of lava on both sides and the great black peak standing at the upper end. At one point there are a waterfall and a Via Mala on a small scale. (Fig. 1.)

The zone from 9,000 to 10,000 feet is a particularly pretty, parklike country, with scattered groves, grassy slopes, and downs covered with bracken and heather. Occasionally places are seen which remind one of Devonshire or Hampshire, with the advantage in favor of Kilima-Njaro that one is not crowded by the other inhabitants. At this season (December) the upper groves are yellow with the bloom of the *Senecio Johnstonii*, varied with reddish fruit-bunches of a tree resembling sumac and the dark green of the giant heather. The grassy downs are sprinkled with heather, campanulas, strawflowers, gorgeous red lilies, and "red-hot pokers."

The forests have a most curious appearance. The trees, although often of very thick trunks, are not tall but somewhat stunted. The trunks and larger branches are completely covered with orchids, lichens, ferns, and moss. From every limb and twig hang long festoons of gray moss (*orchilla?*), while the ground is thickly carpeted with ferns of a species resembling "love in a tangle" (*selaginella*).

Some of the huge tree trunks are perfect botanical gardens, from the number and variety of the plants growing upon them. As to Chaga, it has but few equals on the earth in beauty of scenery. Looking from the porch of my house, the prospect lies before me of hill rising beyond hill crowned with plantations of bananas, hillsides covered with grain, and pastures dotted with flocks of sheep and goats in the little valleys. Two thousand feet below stretches the vast wilderness of plain into Masai-land, with Mount Meru in the distance; above me, over the zone of forest, rises the snow-capped dome of Kibo. Truly one's lot might be cast in worse places than in Chaga.

Chaga stretches from Useri upon the extreme northeast corner of the mountain to Kibonoto on the southwest corner, a distance of about 60 miles, and is inhabited by a population of about 60,000. At no point does the cultivation extend lower than 3,000 feet, and nowhere above 5,400. This narrow zone is from two to four or five miles wide. It is divided into no less than thirty states, each governed by a more or less independent sultan, and separated from its neighbors by a strip of wilderness or by a deep gorge, as the case may be. The largest state, Machame, contains probably 10,000 people, while some of the lesser have only a hundred or two subjects.

The state of Useri lies at the northern corner. It has a population of 5,000 to 6,000, and is governed by Malimia, an energetic sultan, who is, however, rather shy of strangers, having a fear of being bewitched. When Bishop Parker visited him a few years ago he was kept waiting two days before being accorded an audience.

Mr. Stephens and I visited him a year since, but his majesty declined an interview. West of Useri lies Kimangelia, divided among a number of small chiefs, all feudatories of Useri. South, along the whole east face of Kilima-Njaro, are the Rombo, the poorest and most primitive of the Wa Chaga. They have but little intercourse with the coast traders, and no European has yet visited their country. They are divided into at least ten chieftaincies, some of which are feudatories of Mandara; others, being independent, form convenient hunting-grounds for the slave raids of that chief and his allies.

At the southeast corner of Chaga is the little state of Mwika; next to the westward is the Msai, divided into upper and lower. Then comes Mambo. All these are small and unimportant. Next in order is Marang, whose sultan, Miliari, has 500 to 600 warriors. He is a great friend to the Europeans, and is about the best chief to have intercourse with that can be found in Africa. I have lived in his country many months, and never had the slightest trouble with him. All his Eu-

ropean visitors give him the same good character, a most unusual one among Africans. To the west of Marang is Kilemma, whose chief, Fumba, is remarkable for his begging habits, extraordinary even for a negro sultan, and which render him an extremely unpleasant host. Passing the unimportant State of Kirua we come to Moshi, whose sultan, Mandara, has made himself quite famous throughout east Africa, and has even sent ambassadors to the Emperor of Germany. He is very energetic, and is the head of the confederacy against Cena, chief of Kibosho, who is his great enemy. Mandara was given a very bad name by former travelers, and he robbed one of them (Mr. New), who came here in 1874, of everything he possessed. However, he may have changed since, as he has seen many Europeans; for although I have lived in Moshi six months, scarcely any trouble or annoyance has ever been offered to me.

Mandara has had more intercourse with strangers than any other chief, and has accumulated European curiosities of every imaginable description—toy steam-engines, clocks, guns of many patterns, stereoscopes, sewing machines, cavalry helmets, and books, uniforms, and indeed one can scarcely tell what he has not got. These valuables he keeps stored away, bringing them out occasionally for his own amusement or to exhibit to the envious eyes of visiting chiefs. The next state west of Moshi, Mpokomo, has recently been annexed by force by Mandara. Beyond this is the state of Uru, whose sultan, Selikia, is remarkable for extreme dullness and stupidity. There are two other states called Uru, one of which was long since depopulated, and the other has been overrun by Cena, and its population swept away or dispersed. Kibosho is next in order, lying a little higher up the mountain. Cena, its sultan, is the most powerful chief on Kilima-Njaro, and seems able to hold his own, although all the other states are allied against him. He is very friendly towards Europeans, and is very liberal in his presents of cattle, etc., to these favored visitors, of whom, however, he has seen but few. He has constructed a large series of underground passages or galleries beneath his boma or stockade. The huts are arranged in a circle, and a sloping shaft leads down from the floor of each hut. From this main gallery another runs off to open out upon a hillside several hundred yards distant. By means of this arrangement his wives and cattle would be able to escape in case of a surprise or sudden attack. Two hundred warriors keep nightly guard around his house.

The next important place is Machame, the most populous state in Chaga. The people are poor and ill governed, the sultan, Ngamine, being a "poor stick." They are much harried by Cena's warriors, who frequently attack them for slaves.

The most western of the Chaga states is Kibonoto, situated upon the long southwestern buttress of Kilima-Njaro. There are a number of other small places, *i. e.*, Kombo, Naruma, Mkinda, Shura, etc., having only a few hundred inhabitants apiece.

As a rule the Wa Chaga are not well made physically, scarcely a six foot warrior can be found and they are rarely well muscled (Fig. 2.) The

Fig. 2.
CHAGA MEN.
Mt. Kilima-Njaro, East Africa.
(From photograph in U. S. N. M.)

women on the contrary, though short, are well built and very erect, due to the custom of carrying loads upon their heads. Their faces, though not negroid, are as a rule not at all pleasant, but some of the young

girls are pretty. Many women of Mandara's harem would be beauties in any country, in spite of their dark skins. The adults are a bad lot, lying and thievish, particularly the men. They compare badly with their forest-dwelling neighbors of Taveita, who are extraordinarily honest. These last are among the dirtiest and worst smelling savages I have ever met with, owing to their frequent unctions of rancid butter

Fig. 3.

CHAGA WOMAN.

Mt. Kilima-Njaro, East Africa.

(From photograph in U. S. N. M.)

and red ocher; while the Wa Chaga are comparatively clean, actually washing themselves occasionally. The wives are compelled to perform their ablutions daily and soap is in great demand. The children are much pleasanter in all respects than the adults, and for innate politeness compare favorably with those of more civilized nations. (Fig. 3.)

The men do a greater share of the field labor than is usual among the Africans. They keep the irrigation canals in repair, attend to the irrigating, and perform the heavy labor of breaking new ground for crops.

The sultans appear to have absolute power over the lives and property of their subjects, but there are many customs that control them. They claim the ownership of all cattle within their dominions, a monopoly of the ivory trade, and they call upon their subjects for making war, for building houses, and for cultivating lands, etc. Before any important measure, a council of chiefmen is held, except possibly by Mandara or Cena, whose rule is quite absolute. When people are wanted for any purpose, heralds are sent out in all directions, proclaiming that the sultan wants men to fight, or bring timber, or whatever he may need. Sometimes the herald blows upon a Kudu horn, and in cases of a general alarm he beats upon a drum. This is a long narrow affair, 4 feet long, by 5 inches wide, hollowed from the trunk of a tree.

Wars are common, and undertaken to obtain either cattle or slaves. These last are sold to the Suaheli traders, who are always waiting around the courts of the principal chiefs.

Honesty is not among the virtues of the Wa Chaga, but if the stranger is a friend of the sultan he is not troubled by thieving. They evince a great partiality for fowls belonging to other people, and seldom lose an opportunity of adding to their capital in this way. My neighbors, Messrs. Morris and Steggall, of the Church Mission Station here, are greatly annoyed by the nightly attempts upon their hen-houses, and the frequent removal of clothing, etc., which may be hung out to dry. My own reputation as a sorcerer prevented me from annoyance in this respect, but my own Suaheli followers were not so restrained, getting into my storehouse during my absence, and carrying off small quantities of cloth, beads, etc., that they imagined would not be missed. Repeated warnings proving of no avail, a spring gun was placed in the storeroom and one of the guardians of my station got shot in the leg while I was hunting. This proved an effectual warning and my reputation as a magician greatly increased, every one regarding the shooting as done by witchcraft.

The women greatly outnumber the men, probably in the proportion of five to three; partly due to the loss of life in war. Polygamy exists, every man has as many wives as he can get, so Chaga is not afflicted with old maids. The wives are purchased with sheep, goats, and cloth, and more rarely for cows. There is a show of carrying off the bride by force; the friends assemble, and festivities with singing, dancing, and yelling take place, and this lasts two or three days or as long as the pombe (beer) holds out.

The bride is decked out with all the beads she can borrow for the occasion, in the shape of girdles, necklaces, etc., and she is plentifully smeared with red ocher.

When a woman is about to increase the size of the family, a noisy iron rattle is worn upon her thigh. Morals are not of a high standard in Chaga and specific diseases have become very common, owing to the

coast caravans. If a Moshi woman is taken in adultery with a Suaheli, she is sold into slavery by order of Mandara, but the law seems rarely enforced at the present time.

The dress of both sexes formerly consisted of a cloak of dressed goat or calf skins, resembling chamois (wash) leather, like those of the Mas-

Fig. 4.

TORIKI OR WAR CAP.

Wa Chaga of Mt. Kilima-Njaro, East Africa.

(Cat. No. 151200. U. S. N. M. Gift of Dr. W. L. Abbott.)

sai. At the present time cloth (white sheeting) is generally used. Bandere (aniline red cloth) is held in high esteem, and so are bright colored calicoes. Cloaks of Hyrax skins, called bilelis, are much used by the men; they are very soft and warm. Boys and young men wear tails or triangular pieces of goat skin about 10 inches long hanging over the buttocks. The little girls wear but little besides a bead girdle and a

small bit of cloth, worked with beads about 6½ inches, hanging in lieu of an apron. All females wear as many bead girdles or belts as they can obtain, often ten to fifteen, also necklaces of large beads and thick collars of small beads. They are very fond of massive bracelets of pewter weighing several pounds each. Copper and iron wire is much used for armlets, rings, and anklets. Fashion is supreme here as elsewhere; only certain sorts of beads are used. Okuta, as the French pearl beads are called, are most in demand in Marang; the fashionable color is blue, while it is white in Moshi. Other beads that are most used are small seed beads, which in their turn are used scarcely anywhere else in Africa. The war dress of the warriors is copied from that of the Masai. A toriki or cap

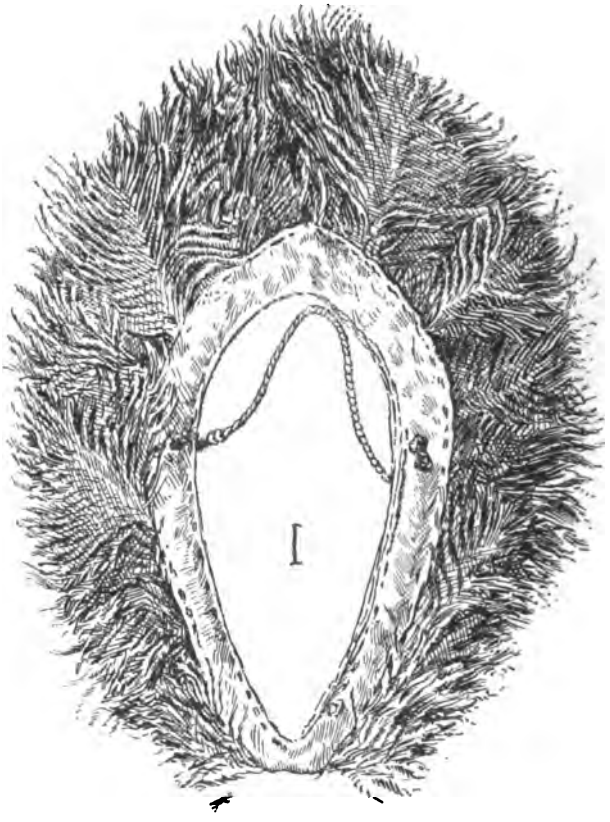

Fig. 5.
WARRIOR'S HEAD-DRESS.
Wa Chaga of Mt. Kilima-Njaro, East Africa.
(Cat. No. 151199, U. S. N. M. Gift of Dr. W. L. Abbott.)

of white monkey skin (Fig. 4), or a ruff of ostrich feathers around the face (Fig. 5), a large cape of vulture feathers, anklets of black monkey skin, with a bit of red cloth around the loins, form an attire striking and picturesque, to say the least of it. But as a rule one does not find all these adornments of dress upon one individual. A string of warriors

filing along a mountain pass with their big shields and great spears flashing in the sun, the red clothes contrasting with their black skins, is a fine sight, and one not to be seen outside the Dark Continent.

The arms are also of Masai model; the spears have long narrow blades, often 2 or 3 feet in length by 2 to 3 inches wide; there is a spike 3 to 4 feet long at the butt, and the wooden handle between only a foot or so in length. The blades are beautifully made and polished, and with their cimés or swords bear witness to the skill of the native blacksmiths. The cimés have blades 2 to 3 feet long by 1½ to 2 inches in width, also carefully polished.

The oval shields are of buffalo hide, 3½ by 2 feet, and painted with the heraldic pattern of the country to which they belong. Many nations

Fig. 6.
HOUSE IN MARANG.
Mt. Kilima-Njaro, East Africa.
(From photograph in U. S. N. M.)

now carry guns, often the Snider breechloader, but they are wretched shots, not having the slightest idea how to take aim. In fighting they generally throw away their guns after the first volley and fight with their spears. In Machame and Rombo, where there has been but little intercourse with strangers, the natives are poorly armed with small and indifferent spears and oval shields 3 feet long, of rhinoceros hide. Some few natives carry bows and poisoned arrows, but excepting a colony of Wa Kamba settled at Mandara's they are very poor shots.

There are no villages; each family lives by itself, in one or more huts, with a granary and some sheds, surrounded by banana plantations (Fig.6). Each wife has a hut to herself. A house is about 15 to 20 feet in diameter and 10 to 12 feet high, beehive shape, built of grass over a framework of sticks (Fig. 7.) In Machame the roof is built of banana fronds and is umbrella-shaped; the walls are perpendicular and about 4

feet high (Fig. 8). The interior of a hut is anything but pleasant to the senses of the European; since it usually contains, in addition to the family, one or more cows, several sheep and goats, and a variable number of fowls. As a fire is kept constantly burning, the smoke, heat, and stench are frightful. The house yard is kept swept clean, and the whole surrounded by a high hedge of dracæna (Fig. 9). The cattle are kept shut up most of the time, and their grass is cut and brought in by the women. Sometimes, as in Rombo and Useri, it is necessary to go long distances, even eight or ten miles, into the plain to obtain good fodder.

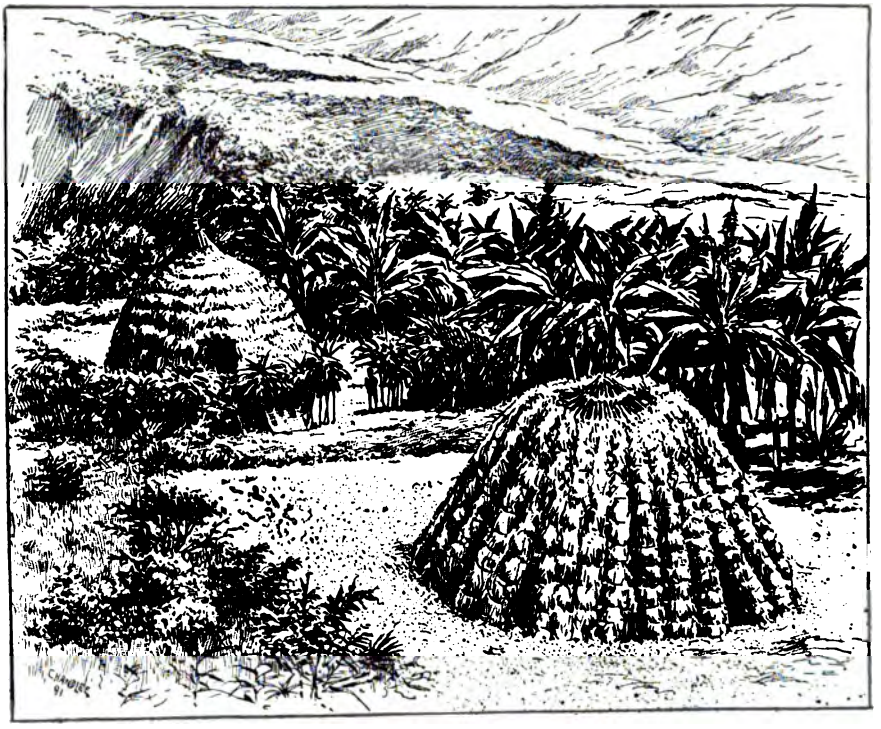

Fig. 7.
METHOD OF HOUSE-BUILDING, MOSHI.
Mt. Kilima-Njaro, East Africa.
(From photograph in U. S. N. M.)

As agriculturists, it would be difficult to find superiors to the Wa Chaga. Their neat little fields of grain are hedged in with dracæna, the soil hoed, weeded, and watered with the greatest care. The irrigation canals are constructed with great ingenuity, sometimes commencing many thousand feet up the mountain, carried down through the primeval forests, around ridges, over gullies on little aqueducts, until they reach the particular valley for which they were intended.

The language is a variety of Bantu, but being, like all savage tongues, very deficient in nouns; originally many words have been introduced

from the Suaheli. There are words for numbers up to ten, and then counting is continued by tens.

The agricultural implements are the usual V-shaped wooden hoe, universal throughout Central Africa—each arm of the V is about 18 inches long; a hoe formed by inserting a triangular flat piece of iron into a heavy wooden handle; axes made by inserting a small triangular piece of iron into a heavy wooden handle; adzes, scoops, or gouges for hollowing out wooden vessels; reaping-hooks with short thick blades. Besides, they make razors, chisels, awls, and large needles out of wire. Iron wire brought from the coast is their sole source of supply. The native blacksmiths are very clever at welding and are really good workmen considering their poor tools. They also make very neat chains of iron and brass. Domestic utensils are largely made from gourds. Plates and dishes are hollowed out from solid blocks of wood, as are also the pombe

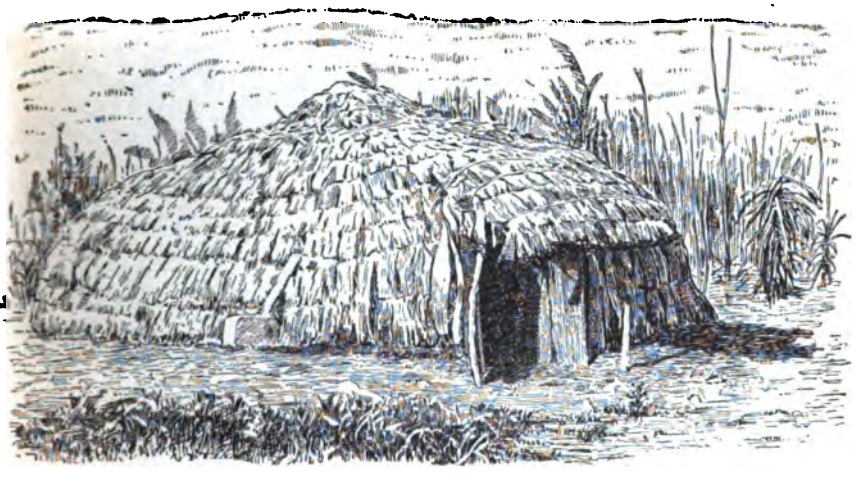

Fig. 8.

HUT IN MACHAME.

Mt. Kilima-Njaro, East Africa.

(From photograph in U. S. N. M.)

(beer) tubs, and the bee-hives, like long, narrow barrels, that everywhere ornament the trees, hanging from the branches.

The domestic animals are the cattle, sheep, and goats. The cattle are of the usual humped variety, of small size. A well-fattened heifer affords as good beef as one can desire. The Rombo especially have the knack of fattening cattle, and Mandara always sends to them for this purpose such cattle as he needs for his own consumption or to present to strangers. The sheep are generally small, only weighing about 25 pounds dressed; they have fat tails and black heads, and the mutton is equal to the best Welsh. The goats are also very good. Those of the plains on the contrary—in Taveita, for example—are very poor eating; the mutton being tough and dry. Fowls are generally kept, but the

mongooses and genets are very destructive to poultry. Milk and butte are plentiful, but have an unpleasant taste, caused by the universal cu tom of washing out the vessels with another fluid derived from th same animal. The list of vegetable productions is very large for savage community. Bananas and plantains, beans of six different v rieties, sweet potatoes, yams, cassava, Indian corn, pumpkins, squashe millet, sugar-cane, and papaws, are among them, while tomatoes an a sort of spinach grow wild in abundance. Salt, of poor quality hov ever, is obtained from the plains of Kahe, south of the mountain.

Fig. 9.

GATE AND HEDGE IN MACHAME.

Mt. Kilima-Njaro, East Africa.

(From photograph in U. S. N. M.)

Great quantities of pombe, or native beer, are made from wimbi, a kin of sorghum. It tastes exactly like ordinary beer yeast, for which it a fair substitute. The natives consume it in great quantities, especial the chiefs, who are half drunk most of the time. Europeans soon gro fond of it, though there is scarcely enough alcohol in it to affect a whi man.

The religion, if it can be so called, is fetichism, universal throughou

Africa where Mohammedism has not penetrated; and, indeed, where it has reached, it is only added to the former. All sickness and misfortune are supposed to be due to the evil influence of some other individual. When boys and others would bring me natural history specimens they always did it secretly, or would bring them after dark, saying that if the Mangi (sultan) found it out he would beat them for bringing me materials for sorcery.

Scattered throughout the cultivated regions, there are numerous small groves of large trees, carefully preserved from injury. These are thought to be the abode of spirits. When a thunderstorm occurs, the spirits are passing from one grove to another. In Machame, which Mr. Skoens and I were the first Europeans to visit, before we were allowed to see the chief the signs had to be consulted, as follows: A goat was brought forward, both parties expectorated freely upon its head, and incantations were mumbled over it. A triangular piece of skin was cut

Fig. 10.
DEAD ELEPHANT.
Mount Kilima-Njaro, East Africa.
(From photograph in U. S. N. M.)

from its forehead, much to the animal's distress; this was divided into strips and a slit cut in each. One of these strips was placed upon the middle finger of each of us by a prominent native, whom, in turn, we ornamented in a similar manner. After this the goat was killed and the entrails examined. The signs being pronounced favorable, we then proceeded to his majesty's presence. He wished to become "blood brother" with me; so, after examining him to make certain of his not having any disease, the operation was proceeded with. Small nicks were made in our right forearms, and each of us then sucked the blood as it flowed from the arm of the other.

I pass now to a consideration of the fauna and flora of this region. The elephant is very common, but rarely met with; it frequents the forest and ascends the mountain to the central ridge. Lieut. Ehlers and I saw the tracks of a half-grown one in the snow at 16,000 feet. The natives take them in huge pit falls or shoot them with poisoned

arrows. (Fig. 10). The lion and rhinoceros, the latter very common in the plains, do not ascend the mountain. The buffalo and the eland go up to the central ridge. Leopards and hyenas wander about the cultivated zone at night. A black variety of the serval cat seems to be peculiar to the mountain. A variety of duiker and a dwarf antelope (*Nanotragus*) dwell at high elevations. I shot a strange dark-colored antelope, of a new species, in the forests at 10,000 feet. The beautiful black and white colobus monkey inhabits the forest zone, and troops of baboons do great damage to the plantations. The strange little cony (*Hyrax brucei*) is very abundant in the elevated forests, and furnishes very fine soft skins for the native's cloaks. Several beautiful sun birds are peculiar to the mountain, one of which (*Nectarinia Johnstoni*) does not descend below 9,000 feet, and is found at the snow line. There is a beautiful turacou and an unusual variety of feathered inhabitants. Many of the butterflies are peculiar. Last November vast clouds of locusts passed over, but few of them alighted and no damage was done. The Wa Chaga ascribe their immunity in this particular to having caught a number and given them *dower* (medicine) and let them go again, to tell the news of their illtreatment to the other locusts.

The forests are of great extent, but there is very little useful timber. Some splendid wood exists in the neighboring plain, in Taveta, Kahe, and along some of the rivers, but the quantity is not great. In the forest zone the timber is rather stunted. Fan palms and tree ferns are plentiful, the last reaching to 8,000 feet. The giant heather composes most of the higher forests, together with the curious *Senecio Johnstonī*, with its soft pith-filled trunk and head of broad leaves; it grows in gullies and sheltered places up to 14,500 feet. The plants of the temperate regions reminded one of northern Europe—heather and straw flowers, old man (southern wood), bracken, maiden-hair and polypodys, and furze, or something that resembles it.

Kilima-Njaro is in German territory, nominally, at least, the line dividing it from the British concession lying just to the northward. It would be a decided surprise to these dusky rulers to know that they are German subjects, and no longer independent, and considerable persuasion by force of arms would be necessary to prove the fact to their satisfaction. For the consideration of a small present, one can hoist any flag he pleases without the least objection. Here in Moshi, four years since, Gen Matthews hoisted the red flag of Zanzibar. A year later, Consul Holmwood arrived and raised the British ensign. Finally, two years since, the Usagara Company put in an appearance and run up the German flag. Each successive party gave Mandara a good present and got him to agree to the foreign sovereignty, as they supposed. Mandara would keep the flag flying as long as his visitors remained, and then pull it down and give it to his wives to wear as an attractive garment.

For a white man who does not come to Africa to seek a living, and

who is fond of hunting, and does not care for civilized society, Chaga is a capital place to live in; sufficient to eat, fine climate like the summer of northern Europe, glorious hunting grounds within easy reach, and friendly natives. Nowhere in Africa is a white man so sought after. The chiefs are almost ready to fight one another for the possession of these desirable visitors, partly for the reputation which the presence of the stranger gives, and partly because the stranger is a source of presents. His caravan, too, gives a market to the people for their food and other productions. At the present time Mandara is on

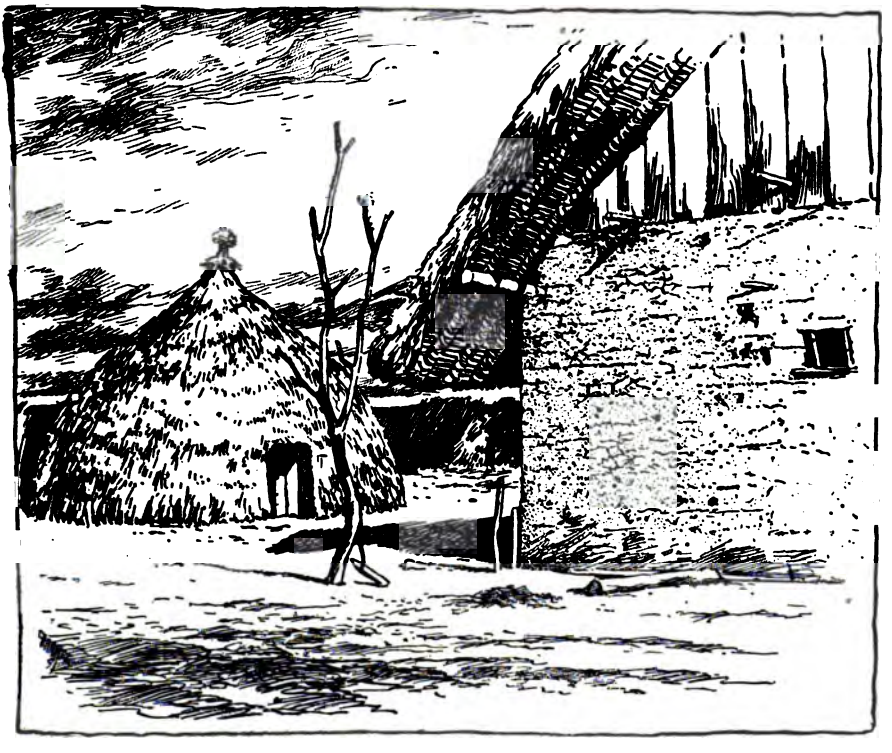

Fig. 11.

HOUSE OF MILIARI, SULTAN OF MARANG.

Mount Kilima-Njaro, East Africa.

(From photograph in U. S. N. M.)

rather bad terms with his son-in-law and principal ally, Miliari, sultan of Marang, alleging that the latter entices away his Europeans, the fact being that Miliari is by far the better fellow of the two, never inflicting the petty annoyances, such as stopping of the market or water supply, things to which the other is unfortunately addicted. Another grievance between them is that Mandara obtained Miliari's sister for a concubine, and never paid the stipulated price (eight cows) for her. Another reason why the white man is held in such high estimation is that no traders have as yet penetrated to these regions; all who have entered as yet

have been sportsmen, explorers, or missionaries, an entirely different class from the wretched mongrel Portuguese who have given Europeans such a bad name in South Africa. It is much to be feared less when the horde of hungry adventurers and "riffraff" of all descriptions get loose upon east Africa, the white man's stock may fall considerably.

Kilima-Njaro with its cool, healthy, and bracing climate will without doubt some day be a great sanitarium for the Europeans from the hot and fever-stricken coast regions. The comparative convenience to the coast adds to its attractions. Kenia, which might otherwise rival it is much more inaccessible, being 150 miles farther inland and the route very difficult. Yet for my part I shall be sorry to see civilization invade this region, and hope the day may be far distant when a railroad (now projected) opens the way into the interior and drives off the herds of game that still pasture within sight of Africa's great snow mountains.

CATALOGUE.*

DRESS AND ADORNMENT.

DRESS. Of tanned goat skins, rubbed with red ocher, beaded on the edges. Sections of skin are pieced together into a sort of shawl. There are no sleeves and apparently no means of fastening the garment. Worn by boys and girls.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151585

DRESS. Of dressed goat skins dyed with red ocher, fringed on three sides.

Wa Chaga tribe; Machame, Mount Kilima-Njaro, East Africa. 151590

FACE-RUFF. Of ostrich feathers, fastened between two oval plates of leather. The rims of the plates are decorated with a line of red paint on a white ground. Worn around the border of the face in war. Loops on the front are for insertion of white ostrich plumes, generally two in number. [Fig. 5, page [12].]

Dimensions, 20 by 14 inches.

Masai tribe; Mount Kilima-Njaro, East Africa. 151199

The manner of wearing this ruff is shown in one of the plates to Fischer's "Masailand", Mittheil. Geog. Gesellsch. in Hamburg, 1882-'3, Heft, II.

FACE-RUFF. Of black feathers sewed between oval pieces of leather. Worn around the face by Chaga warriors in imitation of the Masai.

Outside dimensions, 23 by 16 inches.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151537

FACE-RUFF. Halo of dark plumes set into an oval structure of leather. Worn around the face by warriors in imitation of the Masai.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151538

FACE-RING. Oval ring of leather without feathers. Worn around the face in war.

Masai tribe; Njiri, East Africa 151224

OSTRICH PLUMES. Used as ornaments on apex of face ruffs.

Masai tribe; Mount Kilima-Njaro, East Africa. 151246

*The numbers in this catalogue relate to the entries in the Museum catalogue books of the Ethnological Series.

CASE FOR FEATHERS. Tube of cane or bamboo with leather caps. Used by the Masai to hold the white feathers of the ostrich, two of which are placed at the top of the feather face-ruff.

Length, 19¼ inches.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151813

WAR-BONNET (Toriki). Of monkey skin, with a long skirt. (See fig. 4, page [11].)

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151540

WAR-CAP (Toriki). Made of the skin of the Guereza monkey (*Colobus caudatus*).

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151200

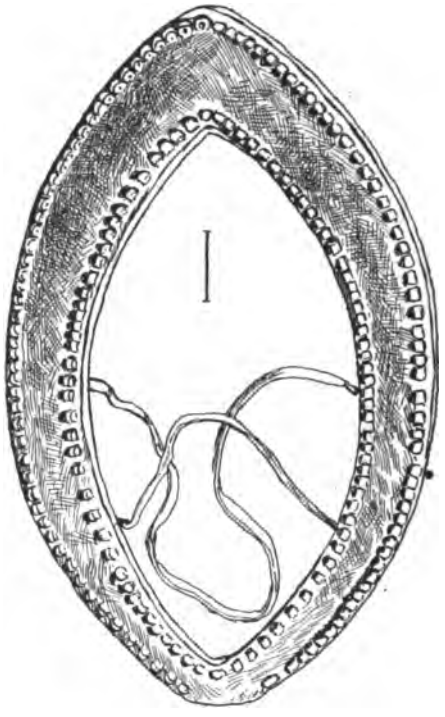

Fig. 12.

FACE RING.

Masai Tribe, Njiri, East Africa.

(Cat. No. 151224, U. S. N. M. Gift of Dr. W. L. Abbott.)

WAR-BONNET (Toriki). A hood made of the long yellow hair of the Guereza monkey (*Colobus caudatus*). It has a short skirt and is beaded on the head-band. The Wa Chaga wear it in imitation of the Masai.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151539

WAR-BONNET (Toriki). Of monkey skin, with long skirt. The bindings and strap which holds it in place on the head are beaded.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151541

WAR-BONNET (Toriki). Of Guereza monkey skin (*Colobus caudatus*). Worn as a hood by Wa Chaga warriors in imitation of the Masai.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151542

COMB. Coarse wooden comb, worn in the hair; also used for scratching the head.

Length, 4¼ inches. Width, 1¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151792

COMB. Neatly made comb of hard wood. The top in form of an open ring, serrated on the outer edge.

Length, 3¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151800

COMB. Of wood, colored with red ocher. Top large and rectangular, with opening cut in shape of an hourglass.

Length, 4¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151822

HAIR ORNAMENTS. Of cow's bone, in shape of an arrow-head; with blue beads around the edges. Worn on the top of the head or on the brow.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151570

EAR-PLUG. Circular plug of hard wood blackened with age and grease. Grooved on the edge. Hole through center from which radiate four pairs of lines. Worn by men.

Wa Chaga tribe, Mount Kilima-Njaro, East Africa. 151569

EAR-PLUG. Plug of soft wood, resembling the bung for a barrel. Worn by men in the lobe of the ear and in some instances the strain is so great as to break the skin.

Diameter, 1¾ inches; 2½ inches and 2 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151238

EAR-ORNAMENT. Small pin of wood, wrapped at intervals with hair. At the end is a carved head. It is worn in a hole through the upper part of the ear, by males only.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151236

EAR-STRETCHER. Conical plug of wood, used to distend the hole in the lobe of the ear.

Length, 2¾ inches; depth, 1¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151237

EAR-STRETCHERS. Rings of blackened wood, fixed in the lobe of the ear.

Diameter, 3¾ inches and 4¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151789

EAR-STRETCHER. An oblong block of wood, grooved, and buttoned in the widely-distended ear lobe.

Length, 4¾ inches; width, 1¾ inches; thickness, 1⅛ inches.
Masai tribe; Mount Kilima-Njaro, East Africa. 151239

EAR-RINGS. One made of wood, wrapped with copper wire, and having two pendants of iron chain. The other is only a plain piece of horn, shaped for the framework of an ear-ring.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151234

EAR-RING. Of horn, with wrappings of beads, and fringe or tassels of iron chain.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151233

EAR-RING. Made of a quill, cut and bent into a loop at the upper end. At the lower end hangs a pendant of iron wire chain of native manufacture, so fine and neatly made as to resemble machine work.

Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151235

EAR-RINGS. Coils of iron wire served at the ends with fine copper wire. Fringes of iron chain hang down from the coils. Worn by men.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151563

EAR-RING. Coil of wire, one turn at each end wound with fine copper wire. This coil is worn horizontally and from it depends a fringe of very fine iron chain, each strand spaced off at the top with a blue bead.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151564

EAR-RING. A worn and broken specimen of the same style as the foregoing.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151565

EAR-RING. Wooden ring and fringe of iron chain. Fastened in the ear by means of a stick run through the ring behind the lobe of the ear.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151566

EAR-RING. Staple of horn, to one prong of which is attached an iron chain with amulets of cow's bone. Worn by men.

Wa Chaga tribe; Kahe district; Mount Kilima-Njaro, East Africa. 151567

NECKLACE. Made of beads and brass wire on leather base; projecting ornament on the edge of the rim, made of a polished disk of shell, pendant, a fringe of small chains.

Masai tribe; East Africa. 151[illegible]

NECKLACE. Made of beads of different sizes on a band of leather. Partly fringed with small chains and beads.

Masai tribe; East Africa. 151[illegible]

NECKLACE. Made of beads, with an iron chain fringe.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151[illegible]

NECKLACE. Small blue and white beads, strung on a piece of stiff wire.

Masai tribe of Tokitoki; East Africa. 151211

NECKLACE. A band formed of strands of native beads, which are seeds rubbed down so as to join closely. Necklace opens at the back.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151571

NECKLACE. Made by looping on a cord a series of little bundles of bark.

Wa Chaga tribe; Kahe district; Mount Kilima-Njaro, East Africa. 151572

NECKLACE. Made of iron and wrapped with iron wire.

Masai tribe; East Africa. 151212

NECKLACE. Copper wire wound around core of brass wire. Worn by both sexes.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151219

NECKLACE. Ring of brass, with design chiseled on the exterior.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151220

NECKLACE. Brass chains, with neatly made pendants of brass wire coiled over iron wire.

Wa ny ika tribe; Mombasa, East Africa. 151798

NECK-RING. Of brass, with incised ornament on the back. Much abraded by use. Said to have come from Ugweno.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151559

NECK-RING. Of brass, with incised ornament on the back. Said to have come from Ugweno.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151560

NECK-RING. Copper wire wound around a core of iron wire. The ends bent so as to form a clasp.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151561

NECKLACES. Broad rings of leather closely beaded on the upper side, the beads being ground down to a flat surface, giving mosaic effect.

Masai tribe, of To'kitoki, East Africa. 151216

NECKLACE. Made of leather and beaded; hanging bavet or fringe, of iron chains. The leather is stiffened with an iron ring which goes round the neck; the lower piece fastens to the girdle.

Masai tribe; East Africa. 151217

NECKLACE. Leather ring, beaded; small fringe of iron chains.

Masai tribe; East Africa. 151215

NECKLACE. Round necklace, wound with beads, with loops at the ends for tying.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151218

ARMLET. Of twined copper wire.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

ARMLET. Beaded leather, fringe of iron chains, with pendants of fi coils of copper wire.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

ARMLET. Of buffalo horn; resembles the gaping jaws of a fish. loop of native-made chain hangs from the armlet. Worn by m only.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

ARMLET. Double, crescent-shaped section of elephant's tusk, hollow out to fit the upper arm, which passes between the two crescen Well made. Worn by men.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

ARMLET. Semilunar in outline, made of ivory. The arm passes b tween the two half-moons. Very old.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

ARMLET or ARM RING. Of old ivory. Small. Worn by men. Beau fully colored and polished by use.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

ARMLET. Strand of blue beads, alternating with loops of fine ir and copper chain. A piece of chain two inches long is hung both ends on the string of beads and depends in a loop. Th alternate on the string the blue beads and the ends of the ch loops.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15

ARMLET. Round plait of grass and string, reddened with ocher.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15

BRACELET. Open brass bracelet, with incised ornament on the ba

Dimensions, 3¼ inches by 3 inches.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15

It is said to have come from Ugweno. The origin of the brass is unkno certainly none of such character is at present brought into the region. T weno Mountains are situated 20 miles southeast of Kilima-Njaro.

BRACELET. Rude, heavy, round bar of tin, bent into an oval. W by girls. Women wear much larger ones, often weighing seve pounds.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15

BRACELETS. Wire coiled around leather thongs. Worn by males.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15

BRACELET. Squared iron bracelet, worn by males.

Diameter, 2¾ inches.

Wa Chaga tribe; Mount Kilima-Njaro. 15

RINGS. For the finger, made of a coil of copper wire. Worn by women.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151227

BEADED BELT. Round belt of blue beads. Loops at the end for securing. Worn by females.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151573

BELT. Round belt, beaded. Worn by women and girls. Sometimes a dozen are worn at one time, and the apron hung over them in front.
Length, 27 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151207

BELT. Flat band of leather, beaded.
Masai tribe; East Africa. 151208

BELT. Leather band, beaded.
Masai tribe; East Africa. 151209

BELT. Made of leather and beaded.
Width, 1¼ inches.
Masai tribe; East Africa. 121210

ANKLET. Cowrie shells, with dorsal portions removed, strung to a leather band.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151230

ANKLE-RATTLES. Little iron bells of semilunar outline, with a slit at the bottom formed by the juxtaposition of the edges. The clappers are small iron balls. The bells are strung on a thong of leather by means of double holes in the top.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151231

ANKLETS. Made of monkey fur.
Masai tribe; Njiri, East Africa. 151223

LEGLET. Of monkey skin (*Colobus caudatus*), and worn on the calves of the legs with the joined ends in front, tied with thongs of rawhide. Edges beaded.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151543

LEGLET. Of black monkey skin, beaded around upper edge.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151544

LEGLET. Bands of black monkey skin, worn after the fashion of the Masai.
Wa Chaga tribe; Kahe district, south of Kilima-Njaro, East Africa. 151545

LEGLET. Made of reddish gray monkey skin, beaded around upper edge.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151546

PLUME. Made by drawing the skin of two monkey tails over a stick. Probably used as fly-flappers.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151551

PLUME. Monkey-tail skin. Probably used as a fly flapper.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151552

TWEEZERS. Rude iron tweezers, formed by doubling a strip of iron together in the middle. Used for plucking out the beard.

Length, 2¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

RAZOR. Rough iron blade, native manufacture. The Angolese use a razor square at the end, like that of Europeans.

Length, 5 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

RAZORS (Kikito). Made of rude iron. Small. Used for shaving scalp

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

SNUFF-BOX. Spent cartridges of brass, beaded, stopper fitted, and chains appended.

Length, 2¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151

SNUFF-BOX. Made of a brass cartridge shell, decorated with beads an iron chain and a brass carrying chain are attached.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1515

SNUFF-HORN. Tip of a horn with leather bottom shrunk on; leather handle fastened on the side, to which is attached an iron chain.

Length, 3½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1512

SNUFF-HORN. Tip of horn with leather bottom shrunk on, suspended by iron chain which is attached to a leather handle on side of horn

Length, 3½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1512

SNUFF-HORN. Made of the tip of a buffalo horn; with wooden bottom

Length, 6½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1512
Snuff is made by pounding tobacco leaves in a mortar. The tobacco has a rich, pleasant odor.

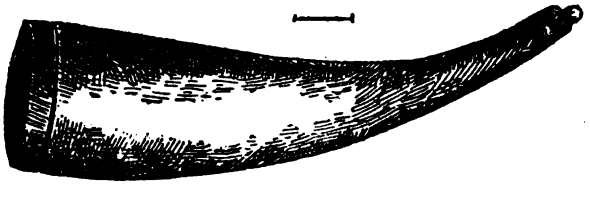

Fig. 13.
SNUFF HORN.
Chaga of Mount Kilima-Njaro, East Africa.
(Cat. No. 151244, U. S. N. M. Gift of Dr. W. L. Abbott.)

ARCHITECTURAL OBJECTS AND FURNITURE.

NATIVE HUT (Numba). Model much too small, and door proportionately too high. (See figs. 6, 7, and 8.)

Wa Chaga tribe; Moshi District, Mount Kilima-Njaro, East Africa. 151818

NATIVE HUT. Model made by Chaga boy. Usual dimensions 10 to 11 feet high and 12 to 15 feet diameter.

Height, 4 inches.

Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151804

WICKER-DOOR (Molie). Model. The door in native huts slides between two upright sticks and the door jamb.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151797

WOODEN STOOL with four legs. Cut out of a log of wood, and smeared with red ocher.

Height, 8¼ inches; depth, 7¼ inches.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151816

WOODEN STOOL with three legs. Painted with red ocher.

Height, 7 inches.

Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151762

MAT. Made of skin. Placed on the ground for sleeping during a journey. Other tribes carry mats of bulrushes. Bought of Masai war party, probably from N'jiri, met with on the Tsavo River.

Width, 18 inches.

Masai tribe; Mount Kilima-Njaro, East Africa. 151201

FOOD-HOOK (Kiwili). Natural forked branch, peeled. Hung in huts for the suspension of articles to protect them against vermin.

Length, 14¼ inches.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151793

GRANARY (Kikombi). Model of a conical thatched hut woven of rods. Entrance under the eaves. The usual size is about 8 feet high, 4½ feet in diameter. Model made by a Wa Chaga boy. These huts are set up on four stones.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151794

GRANARY (Kikombi). Model, differing from the other granary by being placed on supports.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151798

CULINARY UTENSILS.

TRAY-BASKET, (Kitunga.) Coiled tray made of palm leaf. Used for carrying meal, or for winnowing grain.

Diameter, 12 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151[illegible]

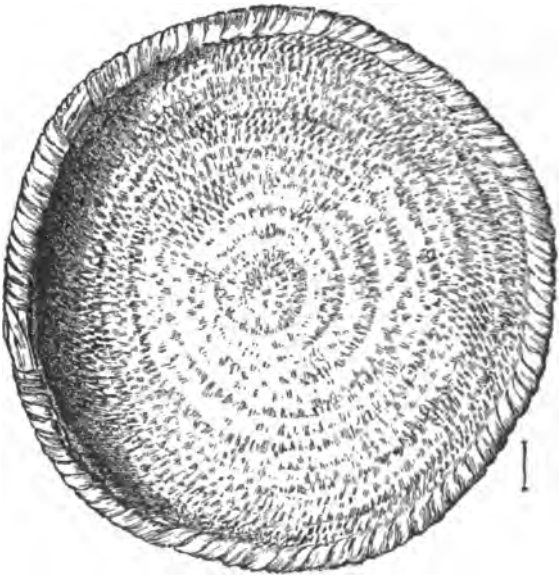

Fig. 14.
COILED BASKET.
Chaga of Mount Kilima-Njaro, East Africa.
(Cat. No. 151772 U. S. N. M. Gift of Dr. W. L. Abbott.)

TRAY. Coiled basket-work, made by sewing strips of Diteba palm leaf over a coil of bulrush.

Depth, 11¼ inches; height, 2¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15120[illegible]

BASKET-TRAYS. Coiled, shallow baskets made of palm, generally used to carry flour.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15158

BAG. Conical; made of fiber closely twined.

Length, 29 inches; width, 29 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15120

BAG. Twined native weaving of brown fiber, with narrow bands of red.
Width, 2 feet; depth, 2 feet.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151583

BAG. Of cord, closely twined.
Length, 19 inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151760

WALLET. Made of twined petioles of banana.
Length, 23 inches; width, 21¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151203

TWINED WALLET. Made of coarse fiber in twined weaving and imitates so closely in appearance the wallets of American Indians on the northwest coast as to be almost indistinguishable. (See Smithsonian Report, 1884, Pt. II, p. 293.)
Size, 16 by 15 inches.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151759

WALLET. Large sack wallet, crocheted work in brown twine.
Length, 30 inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151825

HAVERSACKS. Made of palm leaves, checker-weaving.
Suahili, Taveita, East Africa. 151248

COOKING POT (Kinunga). Earthenware pot, made by coiling. Manufactured by the Wa Kahe. Used for cooking.
Height, 7¼ inches; diameter, 7 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151817

BUCKET. Body, a cylinder hollowed out from a log, the cover and bottom of cow skin. Used for honey, and also for carrying flour or other materials.
Height, 13 inches; diameter, 8 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151196

WOODEN JAR (Kimbéla). Wooden vessel with lid. Lugs on side for cord, which also passes through the lug on lid. Blackened on the outside by charring. Used to hold sour milk, etc. [Fig. 15.]
Height, 10 inches; diameter, 8 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151773

WOODEN CANISTER (Kimbéla). Hollowed out from solid wood with a curved knife. Blackened by charring. It has a lid or cover, and is a fine piece of wood-work.
Height, 9¼ inches
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151753

CANISTER (Kimbéla). Made of wood, with lug and lid. A fine example of wood-work.
Height, 9¼ inches; diameter, 5¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151195

WOODEN VESSEL. Cup with handle, hollowed out of solid wood wit[illegible] a curved knife.

Diameter, 5½ inches; height, 4½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517[illegible]

WOODEN CUP. Light wooden cup, with handle having ring of bras[illegible] Probably used for milk.

Capacity, three-fourths of a pint.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518 [illegible]

CUP. Made of gourd. Etching partly scratched and partly bur[illegible] with the back of a knife.

Height, 6¾ inches; diameter 3½ inches.
Wa Chaga or Wa Taveita tribe; East Africa. 1511[illegible]

Fig. 15.
WOODEN VESSEL.
Chaga of Mount Kilima-Njaro, East Africa.
(Cat. No 151773, U. S. N. M Gift of Dr. W. L. Abbott.)

BOWL. Very thin, showing skilled work. Made of wood, in imitatio[illegible] of a gourd, having a lug or handle.

Height, 6½ inches; diameter, 8⅛ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15119[illegible]

BOWL. Made of wood; thin; with handle.

Height, 3 inches; diameter, 6 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15119[illegible]

WOODEN BOWL. Light wooden bowl, with flat bottom.

Diameter, 5½ inches; height 3½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15181[illegible]

PLATE. Probably a manioc mush bowl. Blackened by fire. Cut witl[illegible] a bent knife.

Length and width, 10½ by 9½ inches; height, 2½ inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 15118[illegible]

DISH (Kitela). Very thin, made of wood, with handle, and blackened on the outside by burning.

Depth, 12¼ inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151191

DISH. Wooden dish, rounded bottom, small lug at the side, decorated with beads and iron chain.

Diameter, 6¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151802

WOODEN TRENCHERS. Flat wooden dishes used by Dr. Abbott for his table. [Fig. 16.]

Diameter, 17½ inches to 12¾ inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151754

Fig. 16.
WOODEN TRENCHER.
Chaga of Mount Kilima-Njaro, East Africa.
(Cat. No. 151754, U. S. N. M. Gift of Dr. W. L. Abbott.)

DISH. Model of Wa Rombo dish, oblong and rectangular, with lug at one end. [Fig. 17.]

Length, 5 inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151775

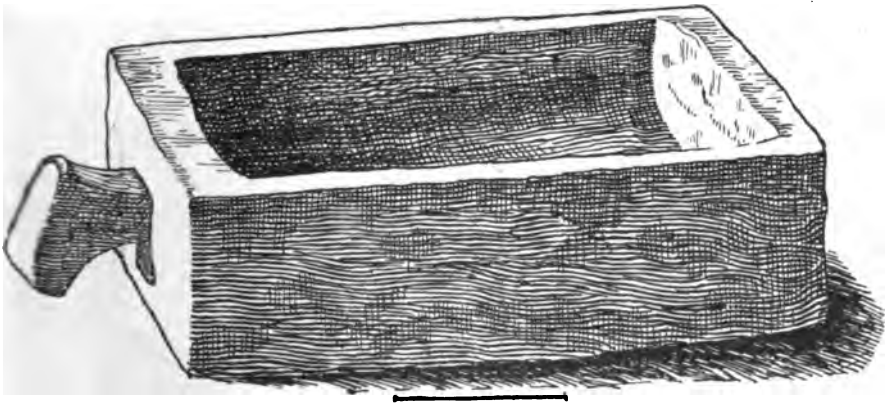

Fig. 17.
WOODEN FOOD DISH (Model).
Rombo of Mount Kilima-Njaro, East Africa.
(Cat. No. 151775, U. S. N. M. Gift of Dr. W. L. Abbott.)

WOODEN DISHES. Carved out of a single piece, and blackened on one side. These dishes have each but one lug on the side.

Diameter, 6¾ to 10½ inches.
Wa Chaga *tribe; Mount Kilima-Njaro*, East Africa. 151779

WOODEN DIPPER. Flat-bottomed wooden dish with lug on the side. [Fig. 18.]

Diameter, 6 inches; height, 4 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151806

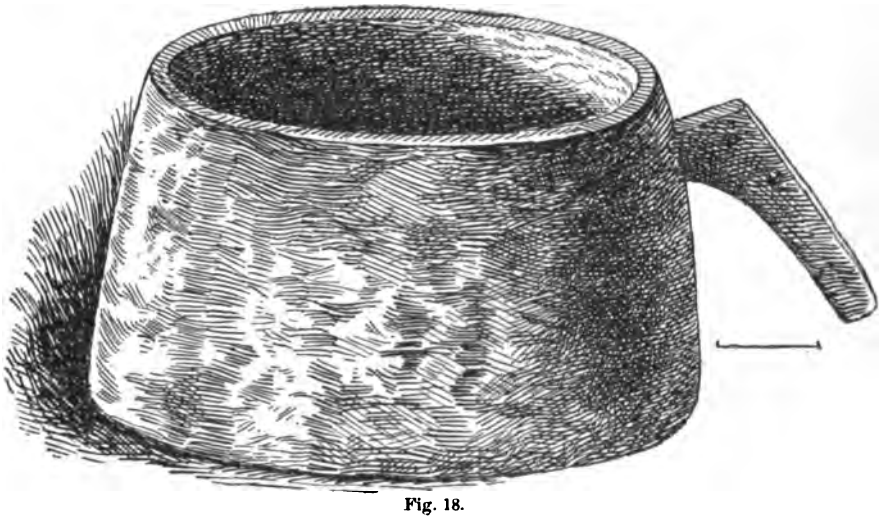

Fig. 18.
WOODEN DISH.
Chaga of Mount Kilima-Njaro, East Africa.
(Cat. No. 151806, U. S. N. M. Gift of Dr. W. L. Abbott.)

WOODEN DISH (Kirambo). Light bowl of wood with one lug. [Fig. 19.]

Diameter, 8 inches; height, 5½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151811

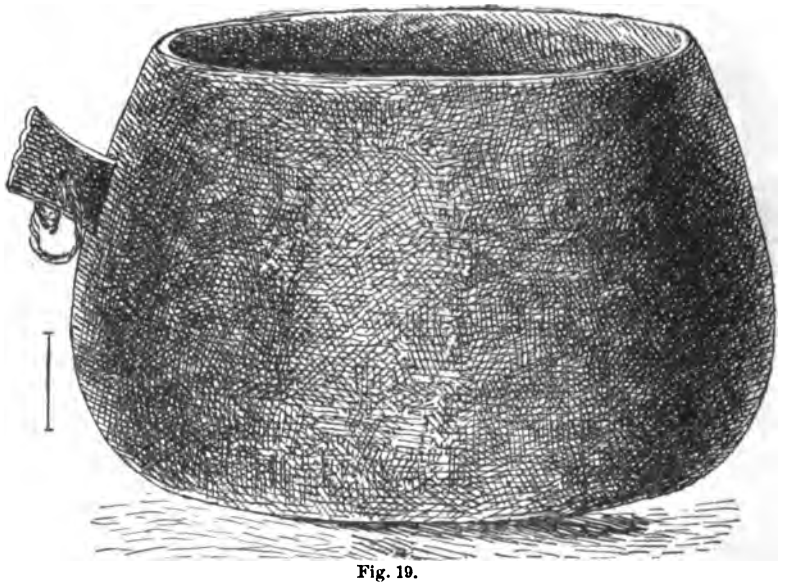

Fig. 19.
WOODEN DISH.
Chaga of Mount Kilima-Njara, East Africa.
(Cat. No. 151811 U. S. N. M. Gift of Dr. W. L. Abbott.)

SPOONS. Carved from a single piece of wood.

Length, 14½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151193

SPOON OR LADLE. Made of wood.

Length, 16½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151580

SPOONS. Made of wood.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151581

DIPPER. Etched gourd; used for dipping beer.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151205

POMBÉ TUB (Kibo). Cut out of solid wood. Lugs on each end for carrying. Used for keeping beer, called pombé.

Length, 16½ inches; depth, 13 inches; width, 11 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151755

POMBÉ TUB (Kibo). Model. The usual size holds from 5 to 20 gallons.

Length, 5 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151758

POMBÉ CUP (Kimbéla). Neatly hollowed vessel of wood with handle like a pipkin. Rounded bottom; blackened exterior. [Fig. 20.]

Height, 6½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151790

Fig. 20.

WOODEN CUP FOR DIPPING BEER.

Chaga of Mount Kilima-Njaro, East Africa.

(Cat. No. 151790, U. S. N. M. Gift of Dr. W. L. Abbott.)

POMBÉ DIPPER. Used in dipping beer or pombé, made from the seeds of sorghum.

Length of handle, 26¼ inches; height of gourd, 5¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15177

POMBÉ DIPPER. Made of an etched gourd.

Length, 20 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518[illegible]

POMBÉ TUB (Kibo). Model of beer tub with lateral partition, differin thus from the usual form. Made by a boy. Large tubs hold fro[illegible] 5 to 20 gallons.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518[illegible]

POMBÉ GOURD-DIPPER. Gourd etched, beaded, and decorated wi[illegible] bits of iron chain; handle wound with string of blue and red bead[illegible]

Length of handle, 20 inches.
Wa Chaga tribe, Mount Kilima-Njaro, East Africa. 1518[illegible]

AGRICULTURAL AND INDUSTRIAL IMPLEMENTS.

AX (Soka). Usual form of a wedge-shaped blade, inserted in the bulbous extremity of the handle.

Length, 17¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151807

AX (Soka). Heavy handle of hard wood. In the knob at the end of the handle is set a chisel-like blade of iron. With this tool all timbering is done.

Handle, 20 inches long; blade, 7 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151765

AWLS. Name of larger, kiwili; of smaller, sumio. Iron awls, set in wooden handles. Larger awl used for making shields, smaller one for sewing skin and cloth.

Length, 13 inches, 7¼ inches, and 6 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151777

WOODEN MALLET (Ku'ooli). Fork of a tree, one limb truncated, the other forming a handle. Used to hammer leather for shields.

Length, 9¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151774

FIRE-STICKS. With channeled fire-socket. Hearth, small, rounded piece of worm-eaten wood with rawhide loop in one end to prevent loss. Drill, a branch of a tree trimmed down. [Fig. 21.]

Drill, 19¾ inches; hearth, 4 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151823

Fig. 21.

Fire-sticks.

Chaga of Mount Kilima-Njaro, East Africa.

(Cat. No. 151823, U. S. N. M. Gift of Dr. W. L. Abbott.)

FIRE-STICKS. Hearth, semilunar; drill with pole cut out of the hea for an attaching string, which is fastened to the hearth.

Length of drill, 21 inches; hearth, 4¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518

NATIVE HOE. Crutch of a tree, with one prong sharpened. Nativ manufacture, and used in most of the cultivation.

Length, 16½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

HOE. A short knob-stick, through which the poll of the iron blade i firmly driven.

Handle, 16 inches long; blade, 7 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

HOE (Koombi). Curved iron blade set in the bulbous extremity of th handle, as in the ax above described.

Length of handle, 18½ inches; length of blade, 9 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518

CURVED KNIFE, or GOUGE (Ukombo). Used for excavating woode jars and dishes. Blade curved at the end in form of a hook c horseshoe, and fastened in strong wooden handle.

Length, 15 inches; blade, 1¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

HOE. Crutch of wood with one prong sharpened, the other forming handle. This is the most primitive form of hoe.

Length, 21½ inches,
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

CHOPPER and REAPING HOOK. Used in planting manioc. A sta is taken in the hand, thrust into the ground, and the section abo ground chopped off with the hook, etc. Used also for planti sugar cane. Also used in harvesting the crops.

Length, 13 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

REAPING KNIFE or HOOK. Slightly curved blade, set in wooden ha dle, used in cutting corn, etc.

Length of blade, 4½ inches; handle, 15½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518

REAPING KNIFE. An exaggerated form of the common small knife use among the Chagas. For cutting corn, etc.

Blade, 6½ inches; handle, 11¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1518

WOODEN MORTAR (Kieura). Model of mortar used by natives to pour grain, etc. Made by a native.

Height, 6½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 1517

MORTAR. A half-size model. A pestle 6 feet long and 3 inches in diameter is used with the original.

Height, 11½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151763

CHURN-DASHERS (Kidigo). Paddle made by crossing two flat pieces of wood in splits made in the bottom of the rod. Twirled between the palms of the hands in making butter.

Lengths, 16½ and 21½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151820

BEE-HIVE (Modu). Model, hollowed log of wood, with plug in each end, hung in trees out in the wilderness, for the wild bees to enter. The natives have no idea of hiving bees as we do.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151756

BEE-HIVE (Modu). Model, same as the one previously described.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151821

GOAT-TROUGH (Imongo). Model of a trough hollowed out of a log of wood. Used for feeding goats.

Length, 10½ inches; width, 4⅜ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151799

GOAT-CAGE (Timba). Model of a cage or basket of woven rods, in which young goats are kept to wean them.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151791

PARTRIDGE-TRAP. Model of the wicker hutch used for catching birds.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151776

RAT-TRAP. The rat puts his head in the hollowed end of a stick and gnaws a cord which releases a spring stick, and draws a loop around its neck.

Length, 13½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151781

WEAPONS OF THE CHASE AND OF WAR.

KNOB STICK. Of hard wood; knob formed on end of stick. Used also as a tobacco pestle. [Fig. 22.]

Length, 20 inches.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151186
All over the world among savages are to be found various forms of throwing or hurling weapons, *e. g.*, the knob-kerry, the Moki rabbit-club, etc. These knob sticks are used by the Africans with great effect.

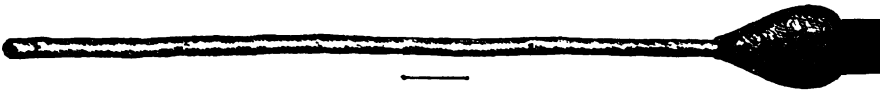

Fig. 22.
KNOB STICK.
Chaga of Machame, Mount Kilima-Njaro, East Africa.
(Cat. No. 151186, U. S. N. M. Gift of Dr. W. L. Abbott.)

KNOB STICK. First cut with an adze, then dressed with the knife, and afterwards rubbed down with the leaf of a shrub which is very rough.

Length, 25 inches.
Wa Chága tribe; Machame district, Mount Kilima-Njaro, East Africa. 151185

KNOB STICK. Branch of hard wood, dressed at one end to a rude bulbous head.

Length, 21½ inches.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151187

KNOB STICK. Made of heavy black wood. [Fig. 23.]

Length, 14 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151188

Fig. 23.
KNOB STICK.
Chaga of Mount Kilima-Njaro, East Africa.
(Cat. No. 151188, U. S. N. M. Gift of Dr. W. L. Abbott.)

ARROWS AND CASE. Point, triangular iron, loosely set into the poisoned foreshaft. Wrapped with leather before use; lashings of sinew, elephant's hair, and palm. Midrib secured by resin. Made by the Wa Kamba for the Wa Taveita. Quiver of cowskin.

Length, 27 inches.
Wa Kamba tribe; North of Mount Kilima-Njaro, East Africa. 151184

QUIVERS AND ARROWS (Uda-quiver, m'fi' arrows). Tubes of leather, with leather cap and thong for suspension. Arrows poisoned. Made by the Wa Kamba, living in Moshi. The arrows are three-feather, foreshafted, finely made. Sold in bundles of four or five, tied up in corn husks. [Fig. 24.]

Length, 26½ to 29 inches (quiver).
Length, 25½ to 27 inches (arrows).
Wa Kamba tribe; Mount Kilima-Njaro, East Africa. 151815

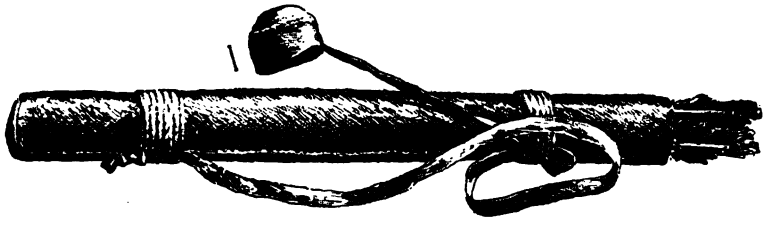

Fig. 24.
QUIVER AND ARROWS.
Wa Kamba of Moshi, Mount Kilima-Njaro, East Africa.
(Cat. No. 151815, U. S. N. M. Gift of Dr. W. L. Abbott.)

BIRD-ARROWS. Long, slender, tapering rods, well polished; nock, bulbous; triple-feathered; points formed by sharpening the shafts and covering them with a poisonous coating.

Length, 24¼ inches.
Wa Teita tribe; East Africa. 151183

BOW. Round wooden bow; well made and strong; hooped at intervals with rings of sinew. String of sinew. The hoops are used to prevent the wood from splitting.

Length, 4 feet 10 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151516

BOW. Round wooden bow, hooped or banded in one place with a ring of sinew.

Length, 4 feet 7¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151517

BOW. Made of a plain branch, with a few projecting knobs. No nocks for string, the occurrence of which is extremely rare in African bows.

Length, 4 feet 3 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151518

BOW. Formed from a branch. The back of bow presents undressed surface, with knobs protruding; belly rounded. No nocks. A most primitive type of this weapon.

Length, 4 feet 9½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151519

SPEAR. Nearly all of iron, very finely made. Spud square, filed off at edges. Blade with median ridge, and narrow in proportion to length. The necks of all these spears are wound with copper wire or sinew. The iron of which the spears are made was brought from the coast by traders.

Length, 7½ feet; blade, 3 feet long, 2½ inches wide; handle, 7¼ inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151521

SPEAR (mk'uke.) Nearly all of iron, finely made and polished. Blade, long, lanceolate, beautifully tapered, and socketed at the lower end for the very short shaft. Spud, a long, gently tapering rod of iron, square in cross section. Wound with copper wire at the points of attachment of the blade and the spear.

Length, 7 feet 2 inches; blade, 31 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151522

SPEAR. Nearly all of iron. Blade very large, broad, lanceolate, high median ridge, fastened to the short handle by a socket. Spud, a long, tapering rod of iron, square in cross section, the corners filed down.

Length, 6 feet 11 inches; blade, 20 inches long, 3¼ inches wide.
Wa Chaga tribe; Marang district, Mount Kilima-Njaro, East Africa. 151523

SPEAR. Finely made. Broad blade, beautifully modeled, socketed onto the short handle. Spud square in cross section.

Length, 7 feet; blade, 26 inches long, 4½ inches wide.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151524

SPEAR. Unpolished, broad, short blade, shows marks of the native hammering. Fastened to a long shaft with a socket wrapped with copper wire. Spud short, as in the typical assagai.

Length, 6 feet 5 inches; blade, 19½ inches long, 4½ inches wide.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151526

SPEAR. Broad, short blade, having the double median flexure. Long handle; short spud.

Length, 6 feet 4 inches; blade, 18 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151527

SPEAR. Spud of square iron, blade polished, broad, lance-shaped. Socket wound with copper wire.

Length, 6 feet, 3 inches; blade, 22 inches long, 3⅛ inches wide.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151528

SPEAR. Long, very slender blade, not polished. Spud square. Showing the work as it comes from the smith's hands. All the work of polishing is done by the warrior.

Length, 6 feet 1 inch; blade 23 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151529

SPEAR. Short spud. Unpolished blade, long shaft.

Length, 6 feet; blade, 20 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151[illegible]

SPEAR. Very broad and short blade, nicely polished. Wound with copper wire; short shaft.

Length, 5 feet 7 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151531

SPEAR. Unpolished blade short and narrow; shaft long; short, square-sectioned spud.

Length, 5 feet 7 inches; length of blade, 12 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151532

SPEAR. Blade, small.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151533

SPEAR. Blade, small; tang thrust into the shaft and fastened on with leather; handle very hard wood.

Length, 5 feet 6½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151534

SPEAR. Hard-wood shaft; finely curved blade.

Length, 5 feet 11 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151535

SPEAR. Shaft of white wood; spud, pentagonal.

Length, 6 feet 11 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151536

SHIELD. Rim formed by turning up the edge of the rhinoceros hide. Stiffener, wrought of wood. Outside of shield painted in zigzag patterns, with boss in center. Found in Rombo and various other states.

Length, 3 feet 1 inch; width, 13¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151744

SHIELD. Of buffalo hide. Like 151744 in construction. Painted inside and outside in red, white, and black, with totem of Moshi. A loop on the side for the arm. A piece of skin protects the knuckles at the hand grip.

Length, 3 feet 2 inches; width, 21 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151746

SHIELD. Constructed like 151744. Painted outside with totem of Moshi.

Length, 3 feet 9½ inches; width, 2 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 15174

SHIELD. Made like 151744. Totem of Moshi on exterior. For boys.

Length, 3 feet 2 inches; width, 15½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151748

SHIELD. Made of buffalo hide stretched over a hoop and fastened at the edges with thongs. Painted on both sides, with totem of Pokomo.

Elliptical, 3 feet 5 inches long; 16½ inches wide.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151749

SHIELD. Made of rhinoceros hide. Like 151744. Zigzag creasing on exterior. Boss over the hand grip.

Length, 3 feet; width, 13½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151750

SHIELD. Of buffalo hide. Made like 151744. Painted in totem of Kilemma.

Length, 3 feet 10 inches; width, 22 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151751

SHIELD. Made of buffalo hide. Painted with totem of Moshi. The design means something different from the ordinary Moshi totem.

Length, 3 feet 10 inches; width, 22 inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151752

SHIELD. An oval or elliptical slab of bark, bound at the edges with a rod wrapped in leather and sewed to the edge of shield. Strengthener, a piece of wood running through middle and formed into a hand grip. Thongs run from each end of the hand grip to the extremities of the shield to keep it curved. Between the hand grip and shield is a piece of heavy hippopotamus skin, horseshoe-shape, over which is fixed a band of cow skin to keep the rough surface from abrading the hand. The shield is penetrable and rather crudely made. It is used by the poorer and least advanced tribes of Kilima-Njaro; being most common in Machame and Rombo.

Length, 4 feet.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151520

SHIELDS. Made of the skin of the buffalo. Oval. Painted in red and white designs (totems). Wooden stiffener with hand grip. Thongs tied from hand grip to each end to keep shield curved.

Height, 3 feet 5 inches; width, 19½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151206

KNIFE. Handle of rhinoceros hide; blade of iron, long and narrow, with median groove.

Blade, 4½ inces long; handle, 4 inches long.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151179

KNIFE. Handle of lightning wood. Blade of iron, long and dagger-shaped.

Length of blade, 3 inches; handle, 4½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151180

KNIFE. Narrow blade, set in wooden handle.

Length, 8 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151795

KNIFE. Sheathed like a sword. Handle of wood, blade of steel, dagger-shaped.

Length of blade, 6½ inches; handle, 4½ inches.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151511

KNIFE. Wooden handle; blade lanceolate. Nicely made and decorated sheath of rawhide.

Length of blade, 7¼ inches.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa. 151511

KNIFE. Long blade, with central ridge beveled evenly to the sides. Wooden handle, neatly made.

Entire length, 16 inches; blade, 11⅝ inches.
East Africa. 151512

KNIFE. Blade beveled evenly, wooden handle.

Whole length, 13¾ inches; blade, 8¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151513

KNIFE. Long narrow blade and slim wooden handle. Sheath, rawhide similar to that on swords in process of construction.

Length entire, 16 inches; blade, 10¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151514

DAGGER. Long blade of uniform width, no dissymmetry. Handle of wood. Sheath of goatskin.

Blade, 14¼ inches; width, ⅞ inch; handle, 4½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151176

DAGGER. Arm-belt of creased leather, handle of lightning wood.

Blade, 7¼ inches long; handle, 4 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151177

DAGGER OR KNIFE. Sheath of cow skin; thong for arm, antelope skin; handle of wood, bound with copper wire.

Length of blade, 4¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151178

BOY'S SWORD (Cimé). Long spatulate blade. Wooden grip with skin shrunk over it. Sheath of skin sewed and shrunk over three pieces of wood. Belt, a narrow strap of leather. Most sheaths have a button on the end, and a staple near the middle to hold the belt. These blades are sharp only on the expanded portion near the point.

Blade, 11¼ inches; grip, 4⅞ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151501 (*a*)

BOY'S SWORD (Cimé). Long spatulate blade, with median ridge; grip of wood. A ridged effect is given by shrinking leather over a spiral cord. Sheath of antelope skin. Belt, a strap around which a flat thong has been wound spirally.

Blade, 13¾ inches; grip, 5 inches. Widest part of blade, 1¾ inches. Narrowest part of blade, ⅝ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151501 (*b*)

SHORT SWORD (Cimé). Grip worn nearly smooth. Sheath made of leather which is shrunk over plates of wood. Belt made by crimping a piece of leather and spacing between the ridges, at intervals, with beads.

Length of blade, 14¼ inches; hilt, 4¼ inches. Blade, 2$\frac{1}{10}$ inches at widest part.
Wa Chaga tribe; Machame district, Mount Kilima-Njaro, East Africa.
151501 (c)

SHORT SWORD (Cimé). Sheath old and worn out; sword good. Crimped belt.

Length of blade, 18⅜ inches; grip, 5 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 121502

SHORT SWORD (Cimé). Sheath old and worn out; sword good. Crimped belt.

Length of blade, 16½ inches; width, 2½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151503

SHORT SWORD (Cimé). Sheath rather poor; blade good. Belt plaited with "in and in" plait.

Blade, 18 inches; grip, 5¾ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151504

SHORT SWORD (Cimé). Crimped belt. The blades of these swords are made of iron wire brought from the coast.

Length of blade, 19¾ inches; grip, 5½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151505

SHORT SWORD (Cimé). Hilt rather smooth; scabbard large for the blade. Crimped belt.

Length of blade, 21⅞ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151506

SWORD (Cimé). Made after the long narrow pattern of the Masai. Scabbard with button at bottom. Bound in one place with serpent skin. No belt.

Length, 23¼ inches.
Wa Chaga tribe; Moshi district, Mount Kilima-Njaro, East Africa. 151507

SWORD. Long, narrow, Masai sword. Crimped belt.

Length of blade, 27 inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151509

SHORT SWORD. Lozenge blade, symmetrical, a rare feature in African blades. Handle wood and leather, the latter the skin of a calf's tail, wet and shrunk on. Scabbard, of goatskin, with stiffener of wood. Belt creased; scabbard covered with cotton cloth.

Blade, 16¼ inches long; length, 2⅛ inches wide; handle, 4⅛ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151174

SWORD (Cimé). Narrow blade with spatulate point. Hilt covered with rough leather; no guard. Sheath of wood, covered with leather; belt of crimped leather.

Length, 28¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151785

SWORD (Cimé). Heavy lozenge or lanceolate iron blade, mounted in plain wooden handle. Scabbard of goatskin. In Kimbundu language, of Angola, they call the central ridge the "spinal column," the two edges "teeth."

Blade, 2 feet long; handle, 5 inches long.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151173

SHORT SWORD (Cimé). Two-edged, creased belt. Scabbard of goatskin.

Blade, 13 inches long, 1¼ inches wide; handle, 4¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151175

MUSICAL INSTRUMENTS AND CEREMONIAL OBJECTS.

RATTLE: Large iron bell with two balls as sounders. Worn by women during first pregnancy, on the lower part of the thigh.

Length, 4¼ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151577

RATTLES. Two little semilunar iron bells, tied to a thong. Worn on the ankles.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151575

ANKLE RATTLES. Iron bells, semilunar in shape, with sounders of iron balls, fastened in pairs to a thong of leather and worn on the ankles in dancing.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151576

DRUM. Tube of wood closed at one end with a skin head. Used to call the population to arms. It is carried under left arm and beaten with right hand.

Length, 4 feet 2 inches; diameter, 4½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151584

COW BELL. A piece of iron, wrought thin and cut in shape of a dumb bell, then bent at the center so as to form a rude bell, with a clapper attached to the narrow portion at the top.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151578

COW BELL. Native iron work, similar to No. 151578.

Height, 5½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151579

GAME BOARD (Ochi). Rudely hollowed-out compartments in slab of wood, for playing *ban*, a common game throughout Africa. It is played by a number of round nicker seeds or pebbles placed in the different divisions. The game is not understood by Europeans.

Length, 22 inches; width, 9½ inches.
Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151805

MEDICINE NECKLACE. Toe-hoofs of some animal, filled with "medicine," the preparation or composition of which is not known. Strung on an iron chain.

Wa Chaga tribe; Mount Kilima-Njaro, East Africa. 151247

THE BERNADOU, ALLEN, AND JOUY KOREAN COLLECTIONS, IN THE U. S. NATIONAL MUSEUM.

By WALTER HOUGH.

Korea is a peninsula, with an area of about 90,000 square miles, the east coast being formed by the prolongation of the coast of Asia opposite Japan, and the west coast separated from China by the Yellow Sea. On the north it is separated from Manchuria by the Yalu and Tumen rivers.

The country is mountainous and not very fertile. The climate is mild in the southern provinces, and severe on the Manchurian border. The fauna and flora are temperate and resemble those of Japan.

The coast has few good harbors, and is extremely dangerous for navigation on account of shallow water.

Politically, the kingdom is divided into eight provinces, each ruled over by a governor appointed by the King, from the ruling class, and responsible for the administration of affairs.*

There are also four independent provinces, to which governors are appointed. There are about four hundred subgovernors, or magistrates, of districts, also appointed from Seoul. It is estimated by Soh, a native Korean, that there are eighty thousand Government officers in Korea.

The population is variously estimated at from 11,000,000 to 28,000,000; the former figure is probably nearer the truth.

The people, in language and appearance, resemble the Japanese, and form what is known as the Koreo-Japanese stock, whose origin is Manchuria, which country has been aptly termed the "swarming place of nations."

Three types have been observed in Korea, the first characterized by short stature, yellow skin, and other resemblances to the Chinese. These live in the Yellow Sea provinces (Kwang-hai) nearest to China. The second type is also of short stature, swarthy skin, sparse beard, and resembles the Japanese. The third type, which is in great majority and may be taken as typically Korean, is of large stature, light skin showing ruddy color in the cheeks, and has a tendency to high cheek

*For an excellent sketch of the laws and customs of Korea, see an article by Mr. W. W. Rockhill, in the American Anthropologist, Vol. IV, 1891, pp. 177–187.

bones, long face and heavy square jaw, black hair, sometimes wavy, and full beard. This type is found in the north province Ham-Kiung-do, and in the extreme south, in Kiung-sang-do.*

"Among the gentry it is by no means uncommon to meet almost an English face, with round cheeks, small, aquiline nose, well-cut mouth and chin. Even a bright blue eye is not unknown, and the hair is by no means invariably pure black."†

Korean cities are surrounded with heavy battlemented walls of squared masonry studded with portholes, but without cannon, and having gateways of woodwork and tile. In every respect the fortifications resemble those of Chinese cities. (Pl. II.) There are many strongly fortified hill towns for refuge of the people during invasions. Villages are often fortified. Outside of the villages are the pastures and farms. (Pl. III.)

The houses are low, of one story, thatched with straw or with tiled roofs. They are of stone, and in point of stability excel those of the Japanese, who necessarily build with regard to earthquakes. Hewn masonry is common, but the walls are usually laid up of unhewn stone, tied with millet stalks before the spaces are filled with mud. The windows are few in number, square, covered with paper, and run in grooves; outside they are protected by heavy shutters. The roof is very heavy, with low pitch, but does not turn up at the eaves like the Chinese roof. The massive beams which support the roof lose one-third of their value by being pared away at the ends to fit into sockets cut in the top of wooden pillars. The brick and stone work between the pillars do not give much support to the roof.‡ A small city-house would be built in the shape of an L on two sides of a courtyard. A heavy wall separates each house from its neighbor. The entrance from the street is into a lobby, on either side of which is the kitchen and store room. The sleeping and living rooms open into a wide hall or onto a piazza which runs along the side next the yard. Larger houses are more complicated, but they preserve the hall and piazza feature. Often a portion of the house is made of wood and used only in summer.

Houses are heated by the kang, which consists of wedge-shaped flues under the stone floor, leading into a chimney. Farmers' huts are poor structures of stone, with the straw roof held down by a lacing of ropes and with the inevitable gourd vine climbing over it. (Pl. IV.)

There are three classes of people in Korea: (1) nobles; (2) middle class, consisting of doctors, painters, interpreters, scribes, and lower officials; (3) lower class, consisting of those who do manual labor. In the lowest rank of the last-mentioned class are butchers and tanners. The bulk of the population are farmers (Pl. V), who raise little more

* Léon de Rosny: Les Coréens. Aperçu ethnographique et historique, Paris, 1886, 1 vol., p. 90.

† W. R. Carles: Recent Journeys in Korea, Proc. Roy. Geog. Soc., May, 1886, p. 89.

‡ Carles, loc. cit.

EXPLANATION OF PLATE II.

SEOUL, THE CAPITAL OF KOREA.

View of the city wall and North Mountain, from the street upon which the United States legation is situated. "The walls of Seoul, like those of Chinese cities, are of stone, battlemented, with heavy gateways of wood work and tile; the walls are studded with portholes, but there are no cannon." W. R. Carles: Recent Journeys in Korea; Proc. Roy. Geog. Soc., May, 1886.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

EXPLANATION OF PLATE III.

KOREAN VILLAGE NEAR FUSAN.

This village is made up of small houses with thatch and tile roofs. It is surrounded by walls. Back of the village are farms. The lower picture shows the beach and the rude fishing boats.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

TWO VIEWS OF A KOREAN VILLAGE NEAR FUSAN.

EXPLANATION OF PLATE IV

KOREAN FARMERS' HOUSES.

The houses are rather strongly built of stones set in mud; the roof is of thatch held down by a lacing of ropes over which a gourd vine usually clambers. The interior arrangement is simple, and there is always a square window.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

KOREAN FARMERS' HOUSES.

EXPLANATION OF PLATE V.

OLD KOREAN FARMER.

In this plate is shown the costume, and the method of dressing the hair. The full beard is characteristic of the pure Korean. He is smoking the invariably long pipe and leans on a staff.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

OLD KOREAN FARMER.

than is required for home consumption and the payment of the high taxes. Caste is very strong in Korea. The occupations of the people are somewhat limited. The pedlars form a numerous and influential guild, and many children are engaged in this business. (Pl. VI.)

Mechanics, artisans, and tinkers, each with his peculiar outfit, are numerous in Korea, as in China. (Pl. VII.)

The yearly civil service examinations bring together great numbers of students (Pl. VIII) to the capital city. The examinations are conducted like those of China, and the successful competitors are sure of official promotion.

"Korean women have neither legal nor social standing."*

Except servants (Pl. IX), who go about bareheaded, the faces of the women in Korea are invisible. Women of the middle class when walking throw the coat, with sleeves, over the head, concealing the face. (See female costume, p. 450.)

In the palace there are numerous serving women who also embroider and sew; their costume and coiffure are shown in Pl. X. A Korean lady is shown in Pl. XI. It is highly probable that a closer acquaintance with Korean laws and customs will show that women, seemingly hampered by oriental ideas, are really of greater importance as a "power behind the throne" than has been suspected.

"Among other inheritances from China Confucianism has effectively permeated Korea. Buddhism seems not to have gained much of a foothold in Korea and is almost entirely under ban at present. It has often been observed that Koreans have little religious sentiment. Buddhism in Korea is, curiously enough to my mind, much less like the form of that religion obtaining in China, at least in the church ceremonies, if not its dogmas, than is even the Japanese. It presents many curious analogies with the Thibetan form of Buddhism, and in the style of church architecture, painting, etc., it has certainly been influenced by it. Several of the feasts are probably of Buddhist origin; others are Chinese or Japanese; but in most of them a certain indigenous element is perceptible which makes them worthy of our notice. The prominence given to exorcisms in Korea is characteristic of Lamaism, but in no wise of Chinese Buddhism, and may have been introduced with the Buddhist religion, although I am inclined to believe that it is coeval with the earliest existence of this people."†

Mr. Carles, in his excellent account of his travel in Korea, says: "Of superstitious observances there are many, mostly the outgrowth of Taoism. Shrines to the spirit of the mountains, with cairns to which stones are added by passers by, stand at the top of almost every ridge crossed by mountain paths; trees and bushes often have their branches laden with cotton streamers; stones or fossils of unusual shape are

* P. Lowell: Chosŏn, p. 151. In chapter XV of this work appears a complete statement of woman's position in the social economy of Korea.

† W. W. Rockhill: Laws and Customs of Korea, Am. Anthrop. April, 1891.

placed in the shrines, and where hollows have been worn by the weather in sloping rocks by the roadside, every little cavity is frequently occupied by a stone placed there by suppliants for a fair journey; grotesquely carved figures called syou-sal-maki are erected at the entrance of villages to ward off the evil spirits. Taoist priests offer prayers to the mountain spirits for travelers. Evidences of some other religion exists in the which are half-length human figures (miriok) carved in stone. The largest are in Um-jin, near the Keum River in Cholla-do.

Lieut. G. C. Foulk, U. S. Navy, photographed the body and head of a figure 62 feet high, the cap differing from the Buddhist figures. The cap is a column 10 feet high supporting a slab of the same height; a similar column and slab is placed above the latter; bells hang from the corners of the slabs. There are two mirioks between Ko-yang and Pha-ju 25 feet high. One has a round hat and the other a square one, showing, according to Mr. Aston, that the former is to represent heaven, or the male element of Chinese philosophy; the latter, earth, or the female element.*

Perhaps the first ethnological collection ever brought to the West from Korea was a wisely chosen series of art products, to illustrate social and industrial life in Korea, sent to the U. S. National Museum by Ensign J. B. Bernadou, U. S. Navy, in 1884. With this nucleus, and the addition of the fine collection of Dr. H. N. Allen, secretary of the Korean legation at Seoul; a series deposited by Mr. P. L. Jouy, and the gifts of Mr. W. W. Rockhill, Mr. Gustavus Goward and others, the collection has grown in importance and interest.

The collection has been explained and studied by Ensign Bernadou, three Korean gentlemen in Washington (Pom K. Soh, Dr. Philip Jaisohn, and the late Penn Su), Dr. H. N. Allen, Mr. W. W. Rockhill, Mr. P. L. Jouy, Rev. W. E. Griffis, and others, to whom the compiler is grateful for information and suggestions.

Great interest centers in Korea from the fact that "we have there a a human exemplification of the survival of the whole genera of industries and customs, while in surrounding regions these have been swept away or transformed,"† for the reason that Korea pursued a policy of complete isolation for many centuries and has preserved the customs of the T'ang and Ming dynasties of China over four hundred years ago.

The peninsula of Korea, "like Cyprus, between Egypt and Greece, forms the link between the Chinese and the Japanese civilization—the old and the new."‡

The collections to be described are rendered more intelligible by keeping this connection in mind.

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*W. R. Carles: Recent Journeys in Korea. Proc. Roy. Geog. Soc., May, 1886, p. 310.

†Prof. O. T. Mason: Science, VIII, Aug. 1886, p. 115.

‡W. E. Griffis: Korea, Without and Within. Phila., p. 23.

EXPLANATION OF PLATE VI.

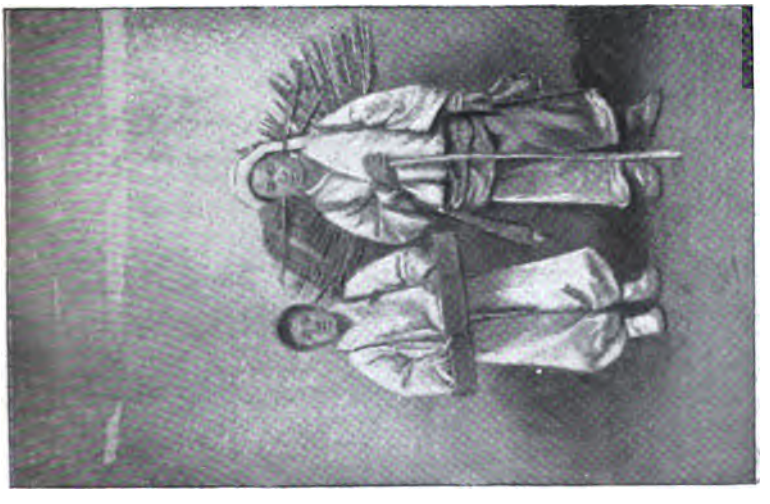
(On the left.)

BOY PEDDLERS. The boy with the square box sells candy, or tobacco, and the boy with carrying frame and large basket on his back sells vegetables. These peddlers are omnipresent in Korea.

(On the right.)

GROUP OF BOYS. Children of a poor family.

(From a photograph by P. L. Jouy in the U. S. National Museum.)



KOREAN BOY PEDDLERS AND GROUP OF BOYS.

EXPLANATION OF PLATE VII.

(On the left.)

KOREAN TUB MENDER. On the carrying-frame he has hoops of bamboo, a saw, and a bag containing awls, knives, etc., necessary for his craft.

(On the right.)

CANDY SELLER. The box is carried in a primitive way, by a rope passing over the back of the neck.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

KOREAN TUB MENDER AND CANDY SELLER.

EXPLANATION OF PLATE VIII.

KOREAN STUDENTS AND GENTLEMEN.

The national costume of Korea is uniformly white, and is somewhat monotonous and cumbersome. The figure on the left of the group is in mourning costume.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

KOREAN STUDENTS AND GENTLEMEN.

CATALOGUE.

AGRICULTURE AND ALLIED INDUSTRIES.

Korea is strictly an agricultural country. The grains raised, samples of which were sent by Ensign Bernadou, are:

(1) Millet, *Ki-tjang*, grown everywhere in Korea and used both as food and to make a fermented drink. A larger variety of millet called *jo* is common and plentiful in mountainous districts and is a staple for the poor.

(2) Sorghum, *sou-sou* (Holeus sorghum). The seeds of a species of sorghum used by the poor.

(3) Barley, *pori*, is grown in all parts of the country.

(4) Rye.

(5) Rice, *moip-ssal*, is a staple. The variety called *tchap-ssal* is used in making cakes of dough of which the Koreans are fond; also, it is fermented to make *soul* or wine like the Japanese *saki*. The Koreans find it not so good for the table as common rice, since it does not readily become soft by boiling and does not expand so greatly.

Wheat and oats are raised.

Many vegetables are raised, chief among which are beans (*pat*) and peas (*kong*), the latter fed to horses, radishes, cucumbers, melons, turnips, yams, cabbage and sprout plants, etc.

The fruits are cherries, raspberries, blackberries, apples, peaches, plums, pears, apricots, quinces, mulberries, persimmons, oranges, lemons, pomegranates, grapes, and dates.

The principal nuts are chestnuts, walnuts, and the water nut called in China *ling* (*Trapa bicornis*).

Flowers are little cultivated, the Koreans not being proficient in ornamental and recreative horticulture.

There are laws compelling the planting and protection of trees, such as lacquer, mulberry, and pine trees. The country has been almost deforested.

The domestic animals are the horse, cattle, swine, poultry, dogs, and rabbits. Sheep and goats are not found in Korea.

The wild animals are the tiger, leopard, deer, bear, fox, wild boar, and a number of animals hunted for the fur, such as the seal and rat-like animals.*

* See Griffis: Korea, p. 216.

MARINE AND FISHERIES.

FRESH-WATER FISHING.

CANT HOOK (Sang-sun-que-nun-soe). Wrought-iron hook pivoted to an upright iron fastening into a socket in the end of a pole. The lower end of the hook is formed into a ring, to which a cord was attached. Superior iron work.

Length, 5¼ inches.
Seoul, Korea. 151602
Collected by P. L. Jouy.
Used on the Han River for dragging fish out of a net.

MANUFACTURES AND OTHER ELABORATIVE INDUSTRIES.

POTTERY AND ITS MANUFACTURE—THE CERAMIC ART.

Korea, now known to the Koreans as Cho-sŏn, was formerly called by them Korai. The Kingdom of Korai ceased to exist just five hundred years ago; during its existence the potter's art flourished. The best ware was made at the city of Song-do, the ancient capital. After the foundation of the Kingdom of Cho-sŏn, the people of Seoul, the new capital, and the people of Song-do were for a long time bitter enemies during the civil war about the year 1400. From this cause the manufacture of pottery at Song-do declined until the Japanese invasion of 1597, when the work ended on the transplanting of the potters to Japan, and may be said to never have been resumed at that city.

"The pottery in common use in Korea at the present time consists of three kinds; the finest of white, pale buff, or bluish porcelain, sometimes decorated in blue and with a high glaze, is used for the table and consists of dishes, bowls, and bottles, also wash basins; the second quality is a pale-yellow ware, glazed, mostly made into bowls, undecorated and used by the poorer classes. * * * The third style of pottery is of the commonest kind, made of dark brown or reddish earth, is glazed inside and out, and has little or no decoration except a wavy line produced by wiping off the glaze, leaving the lighter under surface to show through."*

Color decoration on Korean pottery was revived about ten years ago.†

Mainly the heavier forms survive; the source of these wares are the tombs, in which it was customary from time immemorial to place pottery for the use of the ancestral spirits. While the better class of ware was not generally buried, it is probable that the tombs of the kings, which date back over three thousand years (Soh), and are well known in Korea, contain materials for the history of art in the peninsula, and may prove that porcelain was invented by Korean potters.

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*P. L. Jouy: Korean Mortuary Pottery, Smithson. Rept. II, 1888, p. 591.
†P. Lowell: Chosŏn, p. 171.

EXPLANATION OF PLATE IX.

KOREAN WOMEN OF LOWER CLASS.

A servant and nurse; probably the wife of a farm laborer. The type of face is Tungusic, with high cheek bones and a slight tendency to an oblique setting of the eyelids. Color, dark; stature, medium. The costume is the ancient one prescribed for Korean mothers. (See female costume, p. 431.)

(From a photograph by P. L. Jouy in the U. S. National Museum.)

KOREAN SERVANTS.

EXPLANATION OF PLATE X.

KOREAN SERVING WOMAN IN THE PALACE.

In summer costume. The hair is dressed in the fashion peculiar to court ladies. The coat is always white and the skirt blue. Only the royal family wear red garments in the palace.

(From a photograph by P. L. Jouy in the U. S. National Museum.)

KOREAN SERVING WOMAN IN THE PALACE.

EXPLANATION OF PLATE XI.

KOREAN LADY.

The costume is that of a married woman, and consists of a blue silk skirt and jacket. The cap is ornamented with a perforated jade-disk overlaid with a network of gold rings, and having a tassel of silk. The necklace is made of beads molded of sweet-smelling spices and gums, somewhat after the style of the rose-leaf beads worn by Turkish ladies. The gloves are a recent addition to the native Korean dress.

(From a photograph in the U. S. National Museum.)

KOREAN LADY.

Finer specimens of Korean pottery are to be found in Japanese muse-
ns and in various collections. Japanese wares seem to owe their
cellence to Korean potters.*

The glazed wares of the Song-do potteries, to be described, are seem-
gly protoporcelain, judging from the paste, which is evidently kao-
ic. This variety of heavy celadon, or olive-colored ware, has been
g up from graves in Kiung-ju or Kiou-chiu, the capital city of the
cient Kingdom of Silla, which existed through one thousand years
evious to 1000 A. D.

Korean *pe-chun* (sky color) ware was much esteemed by the Chinese,
l there is a Chinese poem dating from the latter part of the Sung, or
ginning of the Ming dynasty, setting forth the impossibility of imi-
ing the *pe-chun* of Korean pottery. The poem begins, "*Kaoli pe-chun-*
"Korean sky-color porcelain;" *ja* being the Chinese *yao* or porce-
. (Soh.)

he mortuary pottery collection of Mr. P. L. Jouy was found in
ent graves, containing also objects of copper, bronze, and stone.
pottery is of an early type of unglazed and slightly glazed (*vernis*)
henware, of archaic shape. Some of the objects were modeled by
l, patted into shape by an instrument, thrown on a wheel; or, a com-
tion of these methods was used.†

ie Korean potter's wheel consists of a circular table from 2 to 3 feet
ameter and 4 to 6 inches thick, made of heavy wood so as to aid in
ig impetus to it when revolving. In general appearance it is not
unlike a modeler's table. This arrangement is sunken into a de-
sion in the ground, and revolves easily by means of small wheels work-
on a track underneath, the table being pivoted in the center. The
el is operated directly by the foot, without the aid of a treadle of
kind. The potter sits squatting in front of the wheel, his bench
eat on a level with it, the space being left between his seat and the
el to facilitate his movements. With his left foot underneath him
xtends his right foot and strikes the side of the wheel with the bare
of the foot, causing it to revolve.‡

NEWARE DISH (Koriu-ji-jub-si). Dark gray paste containing air-
holes. Slip, dull greenish gray. Shaped like a shallow saucer
with a low foot; it may be a rude cup stand. Slip corroded by
long burial. Pl. XII, Fig. 1, upper line (commencing at the left).

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*W. E. Griffis: The Korean origin of Japanese art, Scribner's Monthly, Dec., 1882.

†P. L. Jouy, Korean Mortuary Pottery. Smithson. Rept. II, 1888, p. 591. "Mr. P.
Jouy, U. S. National Museum, contributed a collection from the prehistoric graves
Ores, in which are included stone daggers, arrow and spear heads, knives, chipped
polished hatchets, polished jade, megatama or curved jewels, amber beads, and a
shed stone ornament. * * * * They are a valuable contribution to prehistoric
æology." (Plate VI.) Report on the department of prehistoric anthropology in
U. S. National Museum, 1889. Report of the National Museum, 1888, p. 330.

‡P. L. Jouy. The Korean Potter's wheel. Science, Sept. 21, 1888, p. 144.

STONEWARE DISH—Continued.

Height, 1½ inches; diameter, 4⅝ inches.
Sŏng-do, Korea. 121615
Collected by Ensign J. B. Bernadou, U. S. Navy.
From the ancient potteries at Sŏng-do.

WINE BOTTLE (Koriu-gi-biung). Heavy vessel with neck. Has a light yellowish granular paste, not very hard; covered with an opalescent slip showing yellow spots and dark brown pits. Pl. XII, Fig. 2, upper line (commencing at the left).

Height, 10 inches; diameter, 6½ inches; height of neck, 3½ inches.
Seoul, Korea. 121614
Collected by Ensign J. B. Bernadou, U. S. Navy.
This specimen, though probably four hundred years old, does not differ greatly in shape from the pottery now made. Dug up in Seoul.

WINE BOTTLE (Sul-biung). Heavy terra-cotta ware, covered with vitreous crackled enamel of a beautiful greenish-gray tint (celadon or olive color). Jug-shaped body; neck, a long tube with bulbous expansion midway. Short spout near the top of the body. Capacity, about 2 quarts. Pl. XII, Fig. 3, upper line (commencing at the left).

Height, 12½ inches; neck, 6½ inches; diameter of body; 4⅝ inches; of base. 3 inches.
Seoul, Korea. 121612
Collected by Ensign J. B. Bernadou, U. S. Navy.
This bottle is an obsolete form of about the twelfth century. Fine old specimens like this are valued equally with real porcelain. Pottery of this class is also interesting as hinting at the origin of Satsuma ware.

WINE CUP AND STAND (Koriu-sul-tjan and tjan-tai). Ancient piece of earthenware, rudely glazed. Stand, a shallow dish with rest in center in which sets the cup. Cup represents the lotus flower; lower portion of cup prolonged to fit in cup stand. Glaze corroded by age. Pl. XII, Fig. 1, lower line (commencing at the left).

Height of stand, 1⅝ inches; diameter, 5⅛ inches. Height of cup, 2¼ inches; diameter, 3½ inches.
Sŏng-do, Korea. 121616
Collected by Ensign J. B. Bernadou, U. S. Navy.
This is mortuary pottery from a tomb near the ancient capital of Korea. From the shape and design it is believed by Koreans to be not less than six hundred years old. Conception and general outline good. Probably used in ancestor worship.

BOWL (Koriu-gi). Paste, coarse, opaque; under the microscope it shows white, porcelanous strings, surrounding granular, yellowish masses; there are occasional brown patches. Glaze, thin yellowish green, patchy, vitreous, and crackled. Color of ware, olive. No evidences of use, as this bowl was dug from a tomb. Pl. XII, Fig. 2, lower line (commencing at the left).

Height, 2¼ inches; diameter, 5⅛ inches.
Seoul, Korea. 130666
Collected by Dr. H. N. Allen.
This bowl is of medium quality, and has the shape of common ware. It is about six hundred years old. Modern Korean potters can not imitate the color.

EXPLANATION OF PLATE XII.

POTTERY OF THE KOREAN PERIOD; ABOUT 915 TO 1400 A. D.

(Upper line, commencing at the left.)

Fig. 1. STONEWARE DISH. Dark gray paste; greenish gray slip; corroded by long burial. Height, 1¼ inches; diameter, 4⅛ inches. (Cat. No. 121615, U. S. N. M. Sŏng-do, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. WINE BOTTLE. Heavy, yellowish, granular paste; not very hard; opalescent slip, showing yellow spots and dark brown pits. Height, 10 inches; diameter, 6½ inches; length of neck, 3½ inches. (Cat. No. 121614, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. WINE BOTTLE. Heavy terra-cotta ware, covered with a vitreous, crackled enamel of a greenish gray tint. Height, 12½ inches; diameter of body, 4⅛ inches; diameter of base, 3 inches; length of neck, 6½ inches. (Cat. No. 121612, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Lower line, commencing at the left.)

Fig. 1. WINE CUP AND STAND. Earthenware; rudely glazed. Glaze corroded by age and burial in the earth. Height of stand, 1⅛ inches; diameter, 5⅛ inches. Height of cup, 2½ inches; diameter, 3½ inches. (Cat. No. 121616, U. S. N. M. Sŏng-do, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

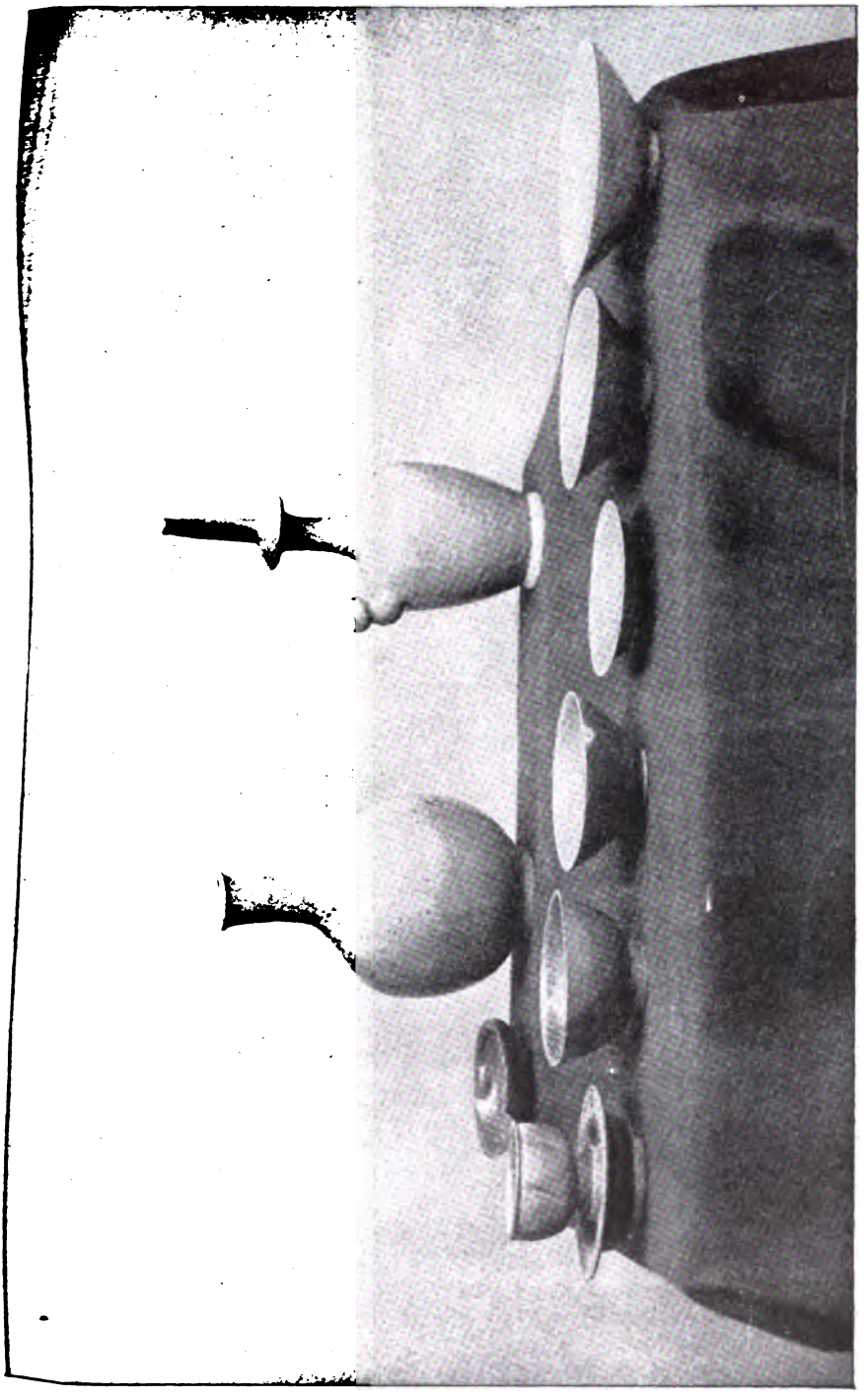
Fig. 2. BOWL. Paste coarse; opaque; under the microscope shows white, porcelaneous strings surrounding granular yellowish masses with occasional brown patches. Glaze thin, yellowish green, patchy, vitreous and crackled. Color, olive. Height, 2⅛ inches; diameter, 5⅛ inches. (Cat. No. 130866, U. S. N. M. Seoul, Korea. Collected by Dr. H. N. Allen.)

Fig. 3. BOWL. Opaque, gray, hard, porcelaneous paste, covered with a greenish transparent glaze; well crackled. Heavy ware. Height, 2½ inches; diameter, 5½ inches. (Cat. No. 121618, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 4. SAUCER. Ancient celadon of opaque, porcelaneous, light gray, hard paste. Glaze thick vitreous green, crackled; the resulting combination giving a beautiful gray-green color resembling some varieties of jades. Height, 1⅝ inches; diameter, 5⅛ inches. (Cat. No. 130885, U. S. N. M. Sŏng-do, Korea. Collected by Dr. H. N. Allen.)

Fig. 5. BOWL. Light gray, opaque, hard paste covered with thick crackled, vitreous glaze, the color of green jade. Glaze vesicular; faint leaf tracing under glaze. Like 130885 in appearance. Height, 2½ inches; diameter, 6½ inches. (Cat. No. 130884, U. S. N. M. Sŏng-do, Korea. Collected by Dr. H. N. Allen.)

Fig. 6. BOWL. Fine, white, hard-paste porcelain, elegant shape, light and delicate. Glaze slightly greenish. Wave or cloud ornamentation worked in the paste under glaze. Extremely rare. Height, 2⅛ inches; diameter, 7$\frac{9}{16}$ inches. (Cat. No. 121619, U. S. N. M. Sŏng-do, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN POTTERY OF THE KORIU PERIOD.

VL (Koriu-gi-bo-si). Opaque, gray, hard, porcelaneous paste covered with a greenish transparent glaze; well crackled. Thrown on a wheel; heavy ware. Pl. XII, Fig. 3, lower line (commencing at the left).

Height, 2¼ inches; diameter, 5½ inches.
Seoul, Korea. 121618
Collected by Ensign J. B. Bernadou, U. S. Navy.
Of the Koriu period.

UCER (Koriu-jub-si). Ancient celadon of opaque, porcelaneous, light gray, hard-paste, covered with a thick, vitreous, green crackled glaze, the resulting combination giving a beautiful gray-green color, resembling some varieties of jade. Pl. XII, Fig. 4, lower line (commencing at the left).

Height, 1⅝ inches; diameter, 5⅝ inches.
Sŏng-do, Korea. 130885
Collected by Dr. H. N. Allen.
This kind of ware is often found at Sŏng-do, the ancient capital of Koriu in a former dynasty, and this specimen is about seven hundred years old, possibly later. The shape, paste, and color indicate the ware of the Sŏng-do potteries. Given by the King of Korea to Dr. Allen.

(Koriu-gi). Light gray, opaque, hard paste; glaze, thick, crackled, and vitreous, the color of green jade. This glaze is quite vesicular, having on that account a grainy appearance, a slightly pitted surface, and dull luster. A faint leaf tracery appears under the glaze. Thrown on a wheel. Of the simple shape still common in Korea. Pl. XII, Fig. 5, lower line (commencing at the left).

Height, 2¼ inches; diameter, 6¼ inches.
Sŏng-do, Korea. 130884
Collected by Dr. H. N. Allen.
Made in the latter period of the Koriu dynasty, about six hundred years ago. This ware is regarded as of very fine quality; to its heaviness is due its preservation.

(Koriu-gi). Fine, white, hard-paste porcelain, elegant shape, light and delicate. Glaze, slightly greenish in tint, likely due to iron; the slight crackle is not uniform and is evidently not intentional. Wave or cloud ornamentation on the inside formed by scraping away the paste, the indentations filling with a thicker layer of glaze and showing deeper tint; corroded patches on outside of the bowl, due to long burial. Pl. XII, fig. 6, lower line (commencing at the left).

Height, 2⅛ inches; diameter, 7⅜ inches.
Sŏng-do, Korea. 121619
Collected by Ensign J. B. Bernadou, U. S. Navy.
This ware is of the Koriu period, from the potteries at Sŏng-do and is about five hundred years old. Pieces of this thin white porcelain are excessively scarce. The incised decoration under glaze is quite common in Chinese porcelain.

BOWL (Jil-tang-quan). Globular, dark red stoneware, glazed on the side subjected to the greatest heat. Used for boiling water, etc. Pl. XIII, fig. 1, upper line (commencing at left).

Height, 5 inches; diameter, 5¼ inches; diameter of mouth, 3¼ inches.
Seoul, Korea, 1885. 121617
Collected by Ensign J. B. Bernadou, U. S. Navy.
Articles in great variety of this ware are to be had, from small bowls to large water jars resembling a barrel in size and shape. The latter are very thin, hard, and well made.

WINE BOTTLE (Sul-biung). Heavy glazed porcelain, ornamented with dragon design in blue. Low, wide body, diminishing rather abruptly into a tubular neck. Capacity, about 5 pints. Pl. XIII, fig. 2, upper line (commencing at the left).

Height, 12½ inches; diameter of globe, 8½ inches; base, 5½ inches.
Hoang-tjou, Korea, 1885. 121613
Collected by Ensign J. B. Bernadou, U. S. Navy.
Average specimen of modern Korean pottery. The Korean potters were unable to impart any color but blue to their white ware up to the revival of color decoration ten years ago. Used in buying and selling liquors, but not at the table.

TABLE WARE (Sa-ban-sang). Heavy porcelain, covered with a patchy glaze of greenish hue. Consists of saucers for fish, vegetables, etc., bowls for same, bowls for soup, rice, stew, and water. Some of the pieces are signed and all show rather rude workmanship. Pl. XIII, figs. 1–6, lower line (commencing at the left).

Hoang-tjou, Korea, 1884. 121620-30
Collected by Ensign J. B. Bernadou, U. S. Navy.
This is the most inferior porcelain ware at present made in Korea. More pretentious vases of antique form, in white decorated with blue, or raised figures if molded, are found in every house. Ware is valued in proportion to its whiteness and the smoothness and brilliancy of the glaze; weight is a minor consideration.

TABLET (Cha-sak-biu-ru-dol). Of porcelain, with three divisions for mixing water colors.

Length, 6½ inches; width, 4½ inches.
Seoul, Korea. 151620
Collected by P. L. Jouy.

THE TEXTILE INDUSTRIES.

The fabrics of Korea are coarse in comparison with the fabrics of China and Japan, and the art of stamping cloth is said to be not known or rather has been lost, as has that of dyeing. The cloths made are of silk, nettle fiber from the *Bachmeria nivea*, called "grass cloth" or "ramie," hemp cloth, and fabrics from cotton. No woolen goods are made in Korea, there being no sheep raised. These fabrics are characteristic; the combinations of different fibers, such as the nettle and silk, make serviceable goods.

EXPLANATION OF PLATE XIII.

KOREAN MODERN POTTERY.

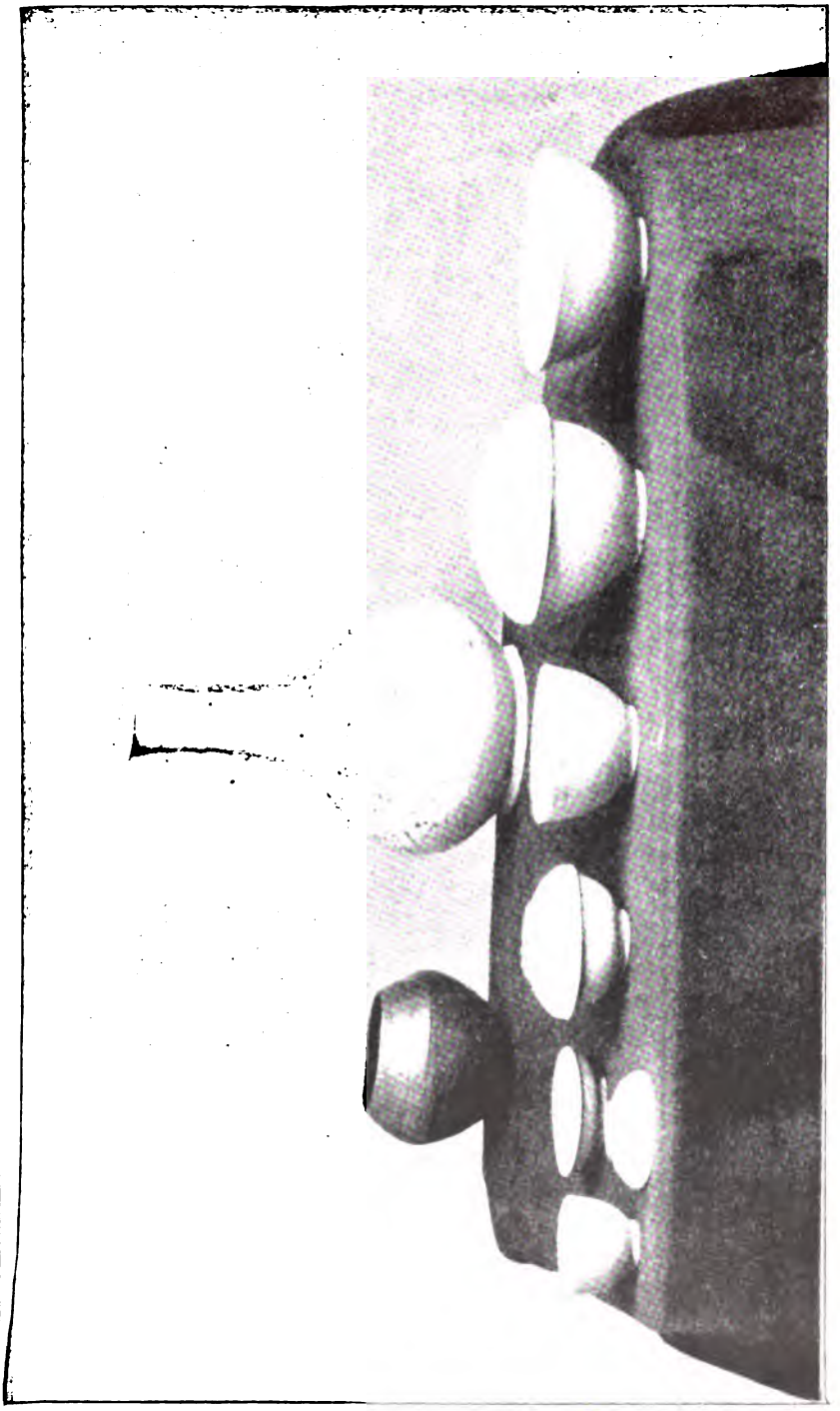
(Upper line, commencing at the left.)

Fig. 1. BOWL. Dark red stoneware. Fire glaze vernis on the side subjected to most heat. Height, 5 inches; diameter, 5¼ inches; diameter of mouth, 3¾ inches. (Cat. No. 121617, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. WINE BOTTLE. Heavy, glazed porcelain; ornamented with dragon design in blue. Height, 12½ inches; diameter of globe, 8½ inches; diameter of base, 5½ inches. (Cat. No. 121613, U. S. N. M. Hoang-tjou, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Lower line, commencing at the left.)

Figs. 1–6. TABLE WARE. Heavy common porcelain, covered with a patchy glaze of faint green tint. Base rough, covered with kilu sand. A few pieces are signed. In order, these dishes are cup for pickle, with lid; saucer for fish or meat; bowl for stew; bowl for soup; rice bowl and bowl for water or gruel. (Cat. No 121620–30, U. S. N. M. Hoang-tjou, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN MODERN POTTERY.

SILK (Hang-na). One of the best fabrics made in Korea.

An-tjou, Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy.
This cloth is used by the nobles and rich for light summer garments.

THIN CLOTH (Saing-tcho). Made of silk and nettle fiber.

Tchou-tjou, Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy. Used for light summer clothing.

BRASS CLOTH (Mosi). Made from nettle fiber.

Province of Chong-Chong, Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy.

COTTON AND SILK (Tjo-tjok).

Province of Kyong-sang, Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy.

HEMP CLOTH (Pouk-po). Three grades of serviceable unbleached cloth.

Province of Ham-Kyong, Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy. Used for mourning garments.

COTTON CLOTH.

Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy.
Made in four of the eight provinces.

SILK (Syo). Creamy yellow pongee like that made in all parts of Korea.

Korea. 7907 H
Collected by Ensign J. B. Bernadou, U. S. Navy.
The man's robe, No. 77099, p. 452, is made of this silk.

GRASS CLOTH (Be). Coarse goods made from the ramie nettle.

Length, 54 feet; width, 14½ inches.
Seoul, Korea. 130859
Collected by Dr. H. N. Allen.
Serviceable cloth for mourning dresses and for underwear. Presented by the King to Dr. Allen. The Koreans have an expeditious process for rotting the hemp used for making fabrics. "At the bottom of a large pit paved with stones, heated stones are placed. Bundles of hemp are pressed down on the stones and kept in position by stakes, the heads of which are above ground. On the hemp piles of grass are thrown, and the grass is closely covered with earth. The stakes are then withdrawn, and water poured through the holes. From the steam thus produced hemp is rotted in twenty-four hours."*

[illegible] (Saing-miun-ju). Fabric of raw silk of medium quality.

Length, 30 feet; width, 12 inches.
Seoul, Korea. 130861
Collected by Dr. H. N. Allen.
Material for summer dress; starched and laundered it is used for winter wear.

SILK (Gop-saing-cho). Fine fabric of medium quality.

Length, 51 feet; width, 14 inches.
Seoul, Korea. 130862
Collected by Dr. H. N. Allen.
For outer garments and underwear worn in summer. Woven in southern Korea.

* W. R. Carles: Recent Journeys in Korea, Proc. Roy. Geog. Soc., May, 1886, p. 304.

LINEN (Saing-mo-si). Fine unbleached ramie cloth.

Length, 35 feet; width, 14½ inches.
Seoul, Korea. 130860
Collected by Dr. H. N. Allen.
Used for dresses of both sexes. Produced in southern Korea.

QUILTED SILK (Pil-nu-bi). Pink; lined with white silk, stuffed with cotton. Quilted one way, the seams being narrow. Done by hand in the palace. The quilting is made to stand up prominently by running *the narrow seam iron (into) along the seams.*

Length, 7 feet 7 inches; width, 13¼ inches.
Seoul, Korea. 130857
Collected by Dr. H. N. Allen.
Made into dresses for young men and women.

PAPER MANUFACTURE.

Paper is made in Korea from the bark of the *tak* tree or paper mulberry. The shoots of this tree are cut early in the fall; they are at once steamed, stripped, and the dark outer coating (used in making inferior paper) is scraped off and the strips are dried. When ready to make the paper, these strips are sprinkled with water and pounded with stones to separate the fiber. They are then boiled in weak lye and the mass afterwards steamed and washed clean in fresh water. The stems of a plant called *tak poul*, which is cultivated for the purpose, are macerated and boiled. The strained liquor is then mixed with the fiber already prepared and water added until it is of the proper consistency. From this paste paper is made by catching a film on the surface of a bamboo screen by a quick passage of this through the pulp. The successive sheets are piled up and separated at one end by straws.

MULBERRY PAPER (Gam-so-miung). Thick, unglazed; made from mulberry bark. Very tough, even with the grain tearing with great difficulty and running in wide shells.

Length, 43¾ inches; width, 29½ inches.
Seoul Korea, 1885. 77069
Collected by Ensign J. B. Bernadou, U. S. Navy.
Korean paper is even tougher than the Japanese, and is one of the few Korean things that had made a reputation in the world before its home had become truly a part of the community of nations. (Percival Lowell: Chosön, p. 315.) It is used in several thicknesses to make armor and was exported to Japan for that purpose, also to China, where it is now used for garment linings. Used in civil service examinations. Taken in payment of tribute by the Government and generally used as currency by the people.

WRITING PAPER AND ENVELOPE. Roll of mulberry paper in sheets; pasted at edges. Fiber, long and silky.

Sheets 15½ inches long, 9 inches wide.
Seoul, Korea, 1885. 77031
Collected by Ensign J. B. Bernadou, U. S. Navy.
Used in writing to a distant place.

EXPLANATION OF PLATE XIV

KOREAN HOUSEHOLD FURNITURE.

CABINET AND WRITING DESK. Front of persimmon wood, hidden portion of pine. Seven drawers of different sizes; two doors closing a recess. Fittings, brass; the key plates on the upper drawers and the doors represent bats, the bodies of which turn aside showing the key holes. Locks, somewhat like European pattern, but the key turns in opposite direction. Height, 23 inches; length, 34 inches; width, 13½ inches. (Cat. No. 77009, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

KOREAN CABINET AND WRITING-DESK.

OILED PAPER (You-tchi). Prepared by steeping sheets of mulberry paper in sesamum oil.

Seoul, Korea, 1885. 77068
Collected by Ensign J. B. Bernadou, U. S. Navy.
House fittings are made of oiled paper; it is used in place of glass for windows, to cover the floors of rooms heated by the Kang or furnace under the house, for hats, rain coats, fans, etc.

THE HOUSE AND ITS ACCESSORIES.

FURNITURE OF THE DWELLING HOUSE.

THE SLEEPING ROOM, ETC.

INLAID CHEST (Ja-ga-son-que). Wood covered with a thin, brownish black lacquer incrusted with mother of pearl. Lid decorated with long life and happiness character (su-bug) and with branches of peach tree, cranes, and clouds (emblems of longevity). On the front is an archæic scene of deer, tortoises, cranes, peach and pine trees, etc., also emblems of longevity. Korean brass lock and key.

Length, 18¼; width, 11¼; height, 12 inches.
Seoul, Korea. 151621
Collected by P. L. Jouy.

TABLE (So-ban). Small twelve-sided wooden table with four legs; painted black. Used by one person. A very poor specimen.

Height, 10 inches; diameter, 15 inches.
Seoul, Korea, 1885. 128410
Collected by P. L. Jouy.
Among many Eastern nations custom demands that individuals should be served separately; hence the nests of boxes in Japan and India or sets of dishes as in Korea.

CABINET AND WRITING DESK (Moon-gap). Front of persimmon wood; hidden portions of pine. Seven drawers, two doors, the latter closing a recess. Three other openings in the front are for displaying small articles. The key plates are brass bats, the bodies of which turn aside disclosing the keyholes. Locks like our drawer locks with bolt and spring together, but the key turns to the right in locking. Pl. XIV.

Height, 23 inches; length, 34 inches; width, 13¼ inches.
Seoul, Korea, 1885. 77009
Collected by Ensign J. B. Bernadou, U. S. Navy.

CABINET (Mu-ri-jang). Dark red wood veneer; imported from China; brass-work on corners, edges, hinges, and panels. It contains twenty-five drawers, most of which are inside the sliding doors. Locks swing on a hinge at edge of one door, and bolt into staple on the other door. Keyhole on under side of lock; key like a pair of tweezers, and unlocks by pressing together the catch-springs on each side of the bolt. Lock fronts, niello work of silver on copper

CABINET—Continued.

with black enamel; design, the "double joy;" character surrounded by a Grecian border. Pl. XV.

Height, 44 inches; width, 30 inches.
Depth, 24 inches.
Seoul, Korea, 1885. 77008
Collected by Ensign J. B. Bernadou, U. S. Navy.
A very skillful piece of joinery; remarkably good considering the inferior tools and lack of accessories in Korea. Used by children and sometimes by ladies as a receptacle for jewels.

LEOPARD SKIN, (Ho-rang-i-ka-juk). Used for covering officers' Sedan chairs and for other purposes.

Length, 52 inches; width, 24 inches
Seoul, Korea. ——
Collected by Dr. H. N. Allen.

RED MATTRESS (Yo) and SQUARE MAT (Bang-suk). Stuffed with hair and covered with red woolen fabric embroidered in bright-colored silks. Edged with green satin and lined with blue satin.

Length of mattress, 6 feet 9 inches; width, 35 inches. Mat, 35 inches square.
Seoul, Korea. 130853
Collected by Dr. H. N. Allen.
A present from the King of Korea to Dr. Allen. These two pieces are a set for a lady's drawing room, and correspond to our sofa and chair.

GREEN MATTRESS (Yo) and SQUARE MAT (Bang-suk). Stuffed with hair and covered with green woolen cloth, embroidered in bright colors. Bordered with changeable silk and lined with blue brocade. Very good workmanship.

Length of mattress, 5 feet 7 inches; width, 33 inches.
Seoul, Korea. 130853
Collected by Dr. H. N. Allen.
A present from the King. Such bright colors are generally used by ladies. All the materials are native except the woolen cloth. Made in northwest Korea.

PILLOW (Be-ga). White cotton cylinder stuffed with hair. Ends embroidered with swans and flowers in bright colors.

Length, 22 inches; diameter, 4⅛ inches.
Seoul, Korea. 130852
Collected by Dr. H. N. Allen.
Small pillow for children. When in use it is covered with a slip of cotton in winter and linen in summer. The ends of pillows are usually of wood, inlaid, and constitute some of the best works of art among the Koreans. (See Pl. XXII.)

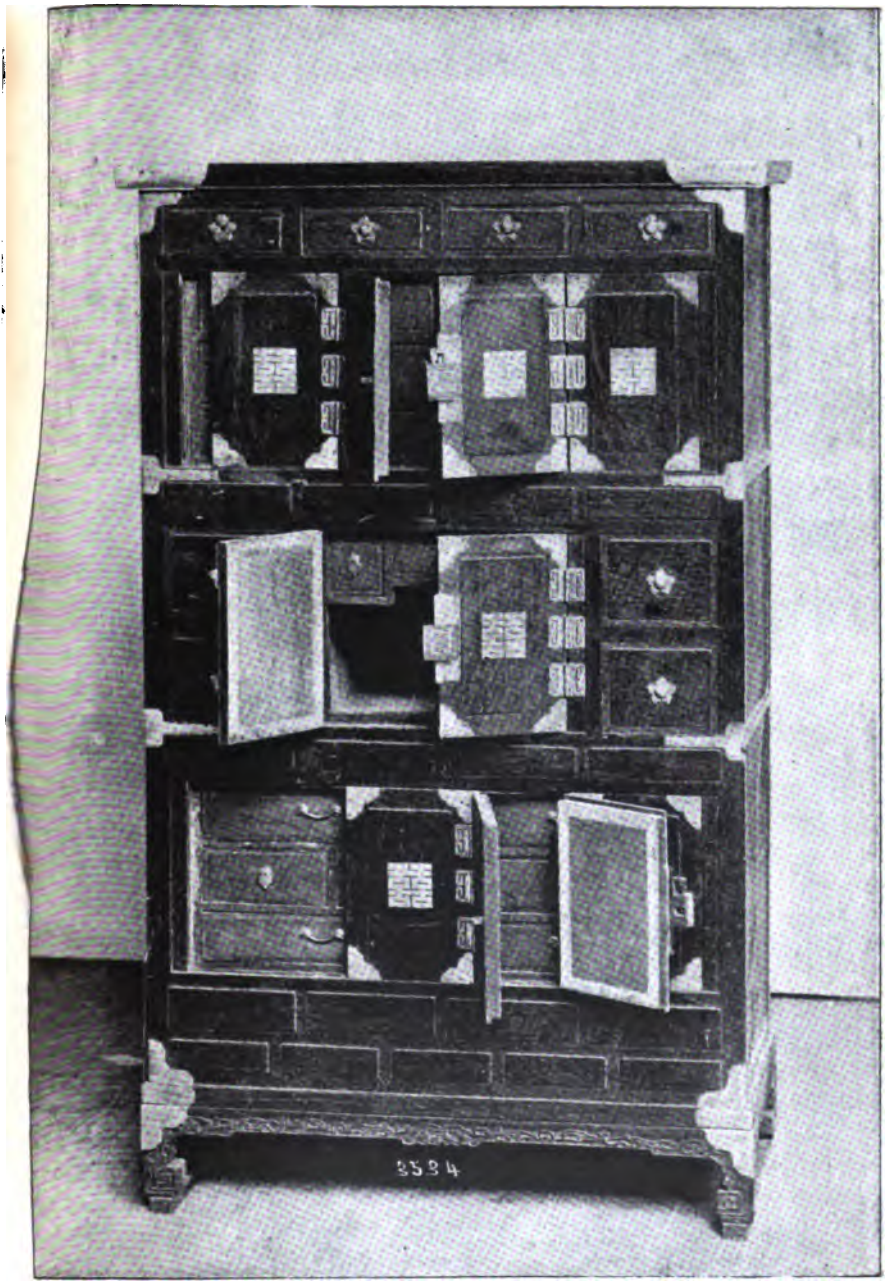
BLIND (Bal). Made of fine splints of bamboo strung together with silk thread and painted with black figures. It is the size of the Korean window, viz:

Length, 5 feet 7 inches; width, 4 feet 8 inches.
Chŏlla-do, Korea. 130887
Collected by Dr. H. N. Allen.
The province of Chŏlla-do is noted for its skillful bamboo workers.

EXPLANATION OF PLATE XV.

KOREAN HOUSEHOLD FURNITURE.

CABINET. Veneered with dark red Chinese wood; ornamental brass-work trimmings. It contains twenty-five drawers, most of which are inside the sliding doors. Lock fronts, niello work; design, the "double joy" character surrounded by a Grecian border. A superior piece of cabinet work. Height, 44 inches; width, 30 inches; depth, 24 inches. (Cat. No. 77008, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN CABINET.

WINDOW SHADE (Bal). Plain and colored slivers of bamboo joined closely at intervals with a warp of green cotton twine. Black bamboo rods at top, middle, and bottom. A straight line ornament is painted in the center and surrounded by a Grecian fret border.

Length, 4 feet 3 inches; width, 4 feet 8 inches.
Province of Chölla-do, Korea. 77021
Collected by Ensign J. B. Bernadou, U. S. Navy.
Very pretty; of superior workmanship. The very fine splints are secured by boiling the bamboo.

RUSH MAT (Jot-ja-ri). Striped green, purple, and red. Hemp warp; rush woof, forming fringe at side of mat. Made by hand on a weighted loom.

Length, 6 feet; width, 2 feet.
Seoul, Korea, 1885. 77010
Collected by Ensign J. B. Bernadou, U. S. Navy.
Used in summer for covering beds and floors. In Japan the standard mat is 6 by 3 feet.

SPITTOON (Ta-gu). Cylindrical cup of brass ware with a slanting cover having an orifice about 1 inch in diameter. Placed in the parlor or near the table at meal times.

Height, 2¾ inches; diameter, 2¾ inches.
Seoul, Korea. 130843
Collected by Dr. H. N. Allen.

LANTERN COVER (Dung-rong-ni). Made of red and blue silk; mouth has a gathering string.

Length, 46 inches.
Seoul, Korea. 130864
Collected by Dr. H. N. Allen.
Probably used in a private house, though this kind of cover is generally used for the lanterns of high officers.

THE KITCHEN AND DINING ROOM.

RICE POT (Gob-dol-sot). Lenticular vessel of black soapstone, with lid. Pl. XVI, fig. 1 (commencing at the left).

Diameter, 15 inches; height, 6¼ inches.
Seoul, Korea. 130883
Collected by Dr. H. N. Allen.
Used also for general cooking. The Koreans like this kind of boiler, as those of iron are too common. Given by the King to Dr. Allen.

COOKING POT (Sin-syöl-lo). Soft, green, micaceous stone, blackened and polished on the outside. It consists of a lid, bowl, and furnace combined, and a detachable base or ash box. In the center of the bowl is a tubular furnace extending up through a hole in the lid, which fits closely around its rim. The furnace has round holes in the bottom and the ash-box has an opening for draft at the side. Food is placed in the bowl and coals are put into furnace. Such a vessel is commonly used for frying meat when several friends as-

COOKING POT—Continued.

semble and cook this portion of their food according to a Korean custom. Pl. XVI, fig. 2 (commencing at the left).

Diameter of bowl, 8¼ inches; depth, 2¼ inches; height of pot, 7½ inches.
Seoul, Korea. 77054

Collected by Ensign J. B. Bernadou, U. S. Navy. Exactly this form of pot is used by the Chinese for making a drink by infusion of various herbs, etc. This pot is used for soup, stew, etc. The more primitive Korean sin-syŏl-lo is a shallow soapstone pot, with a wide, slanting rim. Soapstone vessels are more highly prized in Korea than pottery, and a gift often given by the King is a valuable stone cooking pot.

COOKING POT (Bung-gu-gi-gol). Circular, soapstone vessel shaped like a hat; the slanting rim merges into the shallow bowl. Pl. XVI, fig. 3 (commencing at the left).

Diameter, 8½ inches; depth, 2½ inches.
Seoul, Korea. 151634

Collected by P. L. Jouy.

This pot fits upon the simple charcoal furnace. Meat, etc., are placed on the rim and the juice is collected in the bowl where vegetables are cooking.

CHOPSTICKS (Tjö-ka-rak) and SPOON (Son-ka-rak). White brass. Chopsticks square and heavy; spoon shallow; wide bowl.

Chopsticks, 8 inches long; spoon, 9 inches long.
Seoul, Korea, 1885. 77042

Collected by Ensign J. B. Bernadou, U. S. Navy.

Bowl, spoon, and chopsticks resemble those used in China in making offerings of incense. Used by the poor.

RICE BOWL (Sapal). Of white brass, with lid; turned or "spun."

Seoul, Korea, 1885. 77037

Collected by Ensign J. B. Bernadou, U. S. Navy.

Resembles a Chinese incense bowl. The white metal used in making the alloy comes from China; the copper is Korean.

The following individual set of brass, collected by Dr. Allen, consists of seventeen dishes of eight different shapes and sizes. They form the dinner set used by a man in winter; the dishes having lids. Korean brassware is very good and neatly made by the process known as "spinning." At certain seasons of the year "brass markets" are held in Korea and great quantities of this ware find a ready sale. It is the custom to scour the dishes with stone dust and to wash them often in water.

BOWLS (Jong-ja). Brass, with lid. Set of three for condiment and sauces such as salt sauce, vinegar, and red pepper.

Diameter, 2⅜ inches; height, 1½ inches.
Seoul, Korea. 130903, 130904, 130905.

Collected by Dr. H. N. Allen.

TEA BOWL (Da-jup). Brass; the largest bowl in the set.

Diameter, 6¾ inches; height, 2½ inches.
Seoul, Korea. 130890

Collected by Dr. H. N. Allen.

This bowl is for a drink made from parched rye, taken at every meal instead of tea and coffee, neither of which beverages do the Koreans drink.

EXPLANATION OF PLATE XVI.

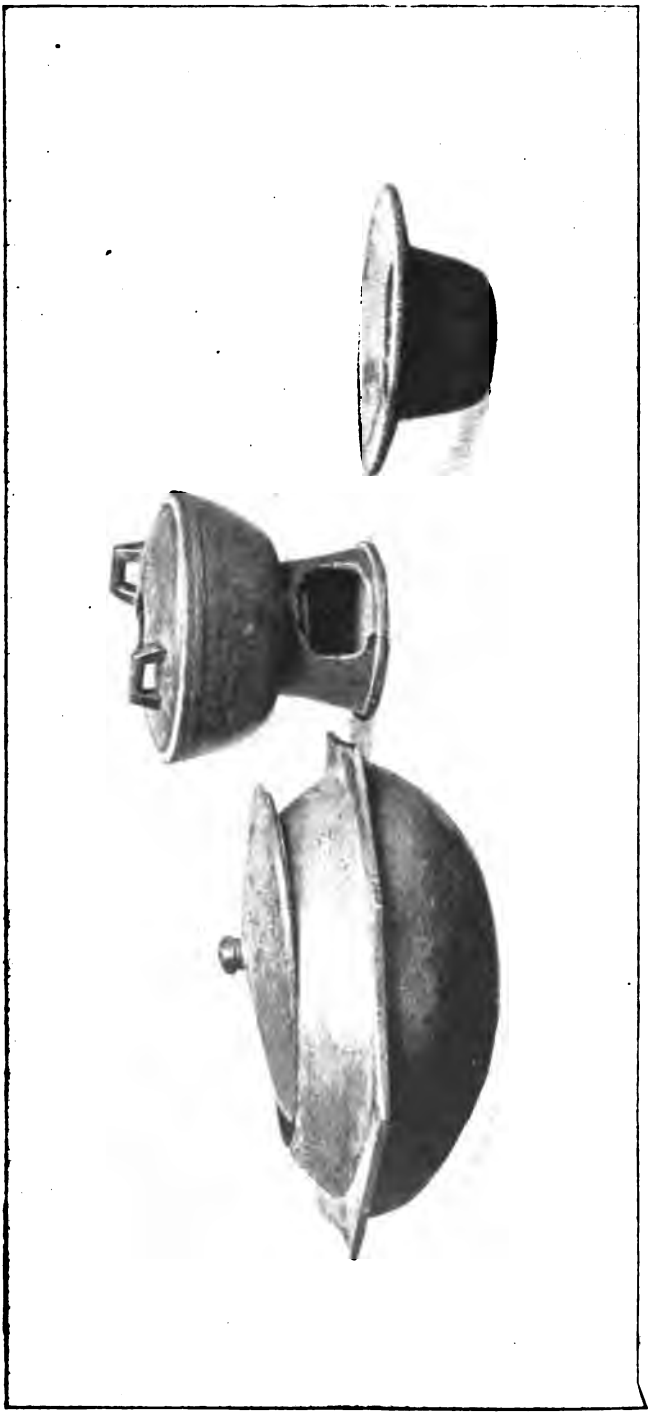
KOREAN STONE COOKING VESSELS.

(Commencing at the left.)

Fig. 1. RICE POT. Lenticular vessel of black soapstone, with lid. For boiling rice and general cooking. Height, 6¼ inches; diameter, 15 inches. (Cat. No. 130883, U. S. N. M. Seoul, Korea. Collected by Dr. H. N. Allen.)

Fig. 2. COOKING PÔT. Soft, green micaceous stone (soapstone) blackened and polished. Detachable base; bowl with central furnace; lid with lugs, tightly fitting around opening of furnace. Height, 7¼ inches; diameter, 8¾ inches. (Cat. No. 77054, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. COOKING POT. Circular soapstone vessel shaped like a hat; the slanting rim merges into the shallow bowl. Fits upon the charcoal furnace. Diameter, 8¼ inches; depth, 2¼ inches. (Cat. No. 151634, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN STONE COOKING-VESSELS.

BOWLS (Jo-chi-bo). Brass; similar to the tea bowl. Used for stew.

Diameter, 4⅛ inches; height, 1⅝ inches.
Seoul, Korea. 130893, 130897
Collected by Dr. H. N. Allen.

SAUCER (Ja-ban-jup-si). Brass; with lid. For dry salt fish and meat.

Diameter, 3⅝ inches; height, 1⅛ inches.
Seoul, Korea. 130895
Collected by Dr. H. N. Allen.

SOUP BOWL (Tang-gi). Bell-shaped; brass; with lid. Smaller than the rice bowl.

Diameter, 4⅛ inches; height, 3 inches.
Seoul, Korea. 130892
Collected by Dr. H. N. Allen.
Used by both sexes.

RICE BOWL (Ju-bal). Bell-shaped; brass; with lid. Used by men alone, the ladies' rice bowl being of a different shape.

Diameter, 5⅛ inches; height, 3⅝ inches.
Seoul, Korea. 130891
Collected by Dr. H. N. Allen.

SAUCER (Sang-sun-gu-i jup-si). Brass; with lid. For cooked fish.

Diameter, 3⅝ inches; height, 1⅛ inches.
Seoul, Korea. 130896
Collected by Dr. H. N. Allen.

BOWL (Chim-cha-bo). Brass; cup-shaped, with lid. For pickles.

Diameter, 3⅝ inches; height, 2⅛ inches.
Seoul, Korea. 130902
Collected by Dr. H. N. Allen.
Korean pickles are not so salt as those eaten in the United States. They are a constant article of the Korean menu.

TRAY (Jang-ban). Circular; brass. Used by the servant at table.

Diameter, 7⅛ inches.
Seoul, Korea. 130890
Collected by Dr. H. N. Allen.

SAUCER (Na-mool-jup-si). Brass; with lid. For all kinds of vegetables. Sometimes from one to three different kinds of vegetables are placed in the same dish.

Diameter, 3⅝ inches; height, 1⅛ inches.
Seoul, Korea. 130899
Collected by Dr. H. N. Allen.

SAUCER (Jut-jup-si). Brass; with lid. For salt meat or fish (not dry); sometimes for raw oysters.

Diameter, 3⅝ inches; height, 1⅛ inches.
Seoul, Korea. 130898
Collected by Dr. H. N. Allen.

SAUCER (Gu-i-jup-si). Brass; with lid. For beef or chicken, the regular dinner dish.

Diameter, 3⅝ inches; height, 1⅛ inches.
Seoul, Korea. 130901
Collected by Dr. H. N. Allen.

SAUCER (Gint-goo-i). Brass; with lid. For game or some rare meat.

Diameter, 3⅜ inches; height, 1¼ inches.
Seoul, Korea. 130894
Collected by Dr. H. N. Allen.

SAUCER (Na-mool-jup-si). Brass; with lid. For some rare vegetable, either cooked or served as a salad.

Diameter, 3⅜ inches; height, 1¼ inches.
Seoul, Korea. 130900
Collected by Dr. H. N. Allen.

BOWL (Hab). Circular; brass; with lid. For holding cakes.

Diameter, 4 inches; height, 2¼ inches.
Seoul, Korea. 130906
Collected by Dr. H. N. Allen.

SAUCER FOR WINE CUP (Jan-ba-chim). Brass plate on which the wine cup is placed on the anniversary of the death of the ancestor.

Diameter, 4¼ inches. 130903
Seoul, Korea.
Collected by Dr. H. N. Allen.

BOWL (Ba-ri). Globular; brass; with lid.

Diameter, 3½ inches; height, 4 inches.
Seoul, Korea. 130907
Collected by Dr. H. N. Allen.
Used by a little girl in winter for rice.

AXE (Dok-ki). Iron. Narrow, wedge-like blade. Curved poll with narrow face.

Length, 7½ inches; width, 2⅛ inches.
Fusan, Korea. 129495
Collected by P. L. Jouy.
Generally used in timbering.

THE LAUNDRY.

SEAM IRON (In-to). Bar of iron terminating in a head, set into a wooden handle. Rude, chisel ornamentation on bar. Resembles a soldering iron. Pl. XVII, upper figure.

Length, 12⅛ inches.
Seoul, Korea, 1885. 77026
Collected by Ensign J. B. Bernadou, U. S. Navy.
Used to iron down seams of clothing or for creasing quilted work.

IRONING STICKS (Pang-mang-i). Hard wood sticks shaped like a base-ball bat, used for ironing or mangling clothes. Pl. XVII, lower figure.

Length, 16⅛ inches; diameter, 1 inch.
Seoul, Korea, 1885. 77027
Collected by Ensign J. B. Bernadou, U. S. Navy.
Winter clothes are ripped apart for washing, boiled in wood-ash lye, beaten on stones in streams, starched with rice starch, dried, piled in heaps, and finally pounded over a wooden roller with clubs till the fiber takes on a remarkable gloss and pliability. The parts are sewed together and the seams ironed down with the seam iron.

EXPLANATION OF PLATE XVII.

KOREAN DOMESTIC APPLIANCES.

(Upper figure.)

Fig. 1. SEAM IRON. Bar of iron terminating in a shoe-shaped head, set into a wooden handle. Rude, chisel ornamentation on the bar. Resembles a soldering iron. Length, 12⅛ inches. (Cat. No. 77026, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Lower figure.)

Fig. 2. IRONING AND MANGLING STICKS. Hard wood, in shape of base-ball bats; used for ironing or mangling clothes. Length, 16⅛ inches; diameter, 1 inch. (Cat. No. 77027, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

KOREAN DOMESTIC APPLIANCES.

IMAGE OF AN ANIMAL (Soe-mal). Rudely made of iron.

Length, 7 inches.
Seoul, Korea. 151603
Collected by P. L. Jouy.
Seems to represent a four-footed animal of no particular species. May be a rest for the iron.

BASKET (Cha-mong). Consists of two oblong portions, one slightly larger and used as a lid for the other. Made of wicker; covered with oiled paper. Used for holding laundry, etc.

Length, 23; width, 11; height, 9 inches.
Seoul, Korea, 1885.
Collected by Ensign J. B. Bernadou, U. S. Navy.

COSTUME.

CHILDREN'S COSTUMES.

The following articles of apparel constitute the best or holiday dress of a boy:

ROBE (Tou-rou-mak-i). For a young boy. Made of coarse red cotton, straight cut; blue tying strings.

Length, 26 inches.
Seoul, Korea, 1885. 77072
Collected by Ensign J. B. Bernadou, U. S. Navy.
This robe is worn over the coat with banded sleeves.

WAIST (Pai-tja). Blue silk, lined with red linen; sleeveless. Fastened by a loop and knot.

Length, 13¼ inches.
Seoul, Korea, 1885. 77075
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by boys over the robe. A band of red brocaded silk across the back bears gilt characters which mean, "Have consideration for others; be just; be moderate in your desires," sentiments early taught Korean children.

OUTER GARMENT (Tyen-pok or Kwa-ja). Thin, blue, brocaded Chinese raw silk stuff, with tying strings of silk. Short slash on either side; long slash in back. Three small embroidered bags with tassels are sewed to the band across the shoulders. Worn in summer by boys.

Length, 26 inches.
Seoul, Korea, 1885. 77077
Collected by Ensign J. B. Bernadou, U. S. Navy.
The Koreans say that there are three spirits who enter the world at the same time with a child to guard him during childhood. Hence the three bags are sewn to the waistband. They contain cotton, and sometimes a lock of the child's hair.

CHILD'S LEGGINS (Haing tjön). Red cotton, tied on above the socks.

Length, 10 inches.
Seoul, Korea, 1885. 77074
Collected by Ensign J. B. Bernadou, U. S. Navy.

TROUSERS (Patji). Pongee silk lined with white cotton. Tied at waist and ankles.

Waist, 21 inches; leg, 23½ inches.
Seoul, Korea, 1885. 77076
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn on holidays by young boys.

JACKET (Sak-dong-tjo-ko-ri). Light green silk faced with blue; lined with coarse muslin. Sleeves, nine bright colored bands of ribbon. Collar, faced with fine grass cloth (mosi); tying strings, scarlet silk.

Seoul, Korea, 1885. 77111
Collected by Ensign J. B. Bernadou, U. S. Navy.
Holiday dresses of boys and girls are made with sleeves like this.

SOCKS (U-rin-a hi-po-syön). Two thicknesses of coarse muslin; heels projecting; toes sharp and curved upward; tying strings midway of back. Instep clocked in colored silks.

Length, 6 inches.
Seoul, Korea, 1885. 77073
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by a small child. Made with regard to shape of the shoe and not of the foot.

HAIR RIBBON (Tang-keui). Purple grenadine folded to point at top and sewed part of the way down. Column of gilt characters.

Length, 14 inches.
Seoul, Korea, 1885. 77078
Collected by Ensign J. B. Bernadou, U. S. Navy.
Tied to the hair plait. The characters mean, "Long life; riches be bequeathed." The seven dots in the circle represent the stars in the "dipper," and are a charm to insure the wearer many children.

ORNAMENTAL HOOD (Gool-ne). Skeleton hood of colored silk, embroidered with characters and decorated with beads, artificial pearls, etc.

Seoul, Korea, 1885. 77079
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by either sex. The characters mean "Long life, riches, health, and happiness." The black ribbon is removed when the child becomes able to speak.

CHILD'S SHOES (Got-tan-hya). Red leather with green and yellow leather foxings. Upper and sole joined together from the outside.

Length, 6½ inches.
Seoul, Korea, 1885. 77081
Collected by Ensign J. B. Bernadou, U. S. Navy.

CHILD'S SANDALS (Sag-jip-sin). Sole woven of hemp; sides of red, white, green, and yellow twisted paper strings.

Length, 6 inches.
Collected by W. W. Rockhill.
Generally worn by children in very poor families.

COTTON BAG (Sam-sung-ju-mu-ni). Yellowish cotton stuff lined with blue cloth; folded at mouth and supplied with a green silk string.

Length, 6 inches.
Seoul, Korea, 1885. 77023
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn under the outer garment and used as a purse or pocket.

WOMEN'S COSTUMES.

QUILTED JACKET (Nou-pi-tjö-kou-ri). Orange silk faced with purple, lined with fine cotton cloth and quilted with thin layer of silk wool. Worn by women in the spring.

Length, 8 inches; waist, 15 inches.
Seoul, Korea, 1885. 77107
Collected by Ensign J. B. Bernadou, U. S. Navy.

SHORT JACKET (Tjök-sam). Fine grass cloth (mosi). Buttoned at the neck with knot and loop.

Length, 8½ inches.
Seoul, Korea, 1885. 77108
Collected by Ensign J. B. Bernadou, U. S. Navy.
The lower class of women in Korea usually leave the breasts uncovered. This form of dress is said to have been devised to facilitate child nursing. (See Pl. VI.)

WAIST BAND (Ho-ri-theui). Wide band of white cotton; lined. Two tying strings.

Length, 37½ inches; width, 9½ inches.
Seoul, Korea, 1885. 77103
Collected by Ensign J. B. Bernadou, U. S. Navy.
The girdle holds up the inner drawers and supports the strings of the other garments.

OUTER DRAWERS (Ko-tang-i). Muslin; gathered at waist.

Seoul, Korea, 1885. 77100
Collected by Ensign J. B. Bernadou, U. S. Navy.
Every Korean lady wears not less than four body garments.

OUTER DRAWERS (Tan-sok-köt). Coarse grass cloth (mosi) made from nettle fiber.

Seoul, Korea, 1885. 77101
Collected by Ensign J. B. Bernadou, U. S. Navy.

INNER DRAWERS (Sok-sok-köt). Bleached cotton; divided skirt type, having a division in the hem cutting the garment into two very wide portions. Tying strings on the left side.

Waist, 32 inches.
Seoul, Korea, 1885. 77102
Collected by Ensign J. B. Bernadou, U. S. Navy.

DRESS SKIRT (Mo-si-teh'-ima). Azure linen stuff; eight breadths gathered at the waistband. Open like an apron; hem turned up and pasted. Tying strings, white.

Waist, 33 inches.
Seoul, Korea, 1885. 77104

DRESS SKIRT—Continued.

Collected by Ensign J. B. Bernadou, U. S. Navy.

Korean women tuck the folds of this skirt into the waistband while walking. The appearance of this garment has led Korean women to say that they dress like western women.

LONG COAT OR VEIL (Tjang-ot). Made of green, brocaded silk, lined with muslin. Collar and cuffs faced with white cotton. Two pairs of tying strings.

Length, 51 inches.
Seoul, Korea, 1885. 77094
Collected by Ensign J. B. Bernadou, U. S. Navy.

This coat is trimmed by a fixed pattern and is invariably worn by women of the middle, and often of the lower class, while outside of the house. It is merely thrown over the head and conceals the face from strangers. There is a legend that a Korean King commanded women to wear blue soldiers' coats, so that on the approach of the enemy the men could seize these coats and at once become soldiers. After the King's death, the style of coat became fixed in the green, brocaded silk, tjang-ot.

UNDER STOCKINGS (Po-syön). Coarse cotton, doubled; sharp toes and projecting heels. They differ from men's socks in not being padded with cotton.

Length, 8 inches.
Seoul, Korea, 1885. 77106
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn under the thicker stockings.

FINGER RINGS (Ka-rak-tji). Of pewter. Worn in pairs on the ring finger by married and single women.

Seoul, Korea, 1885. 77109
Collected by Ensign J. B. Bernadou, U. S. Navy.

HAIRPIN (Pin yö.) Of pewter, with a projection at one side of the head, like the Korean needle.

Length, 7 inches.
Seoul, Korea, 1888. 77046
Collected by Ensign J. B. Bernadou, U. S. Navy.

SHORT HAIRPIN (Tong-köt). Of pewter, with a knob and short neck at the side of the head.

Length, 3 inches.
Seoul, Korea, 1885. 77114
Collected by Ensign J. B. Bernadou, U. S. Navy.

This style of pin is worn by married men and women, though not an invariable custom with the men.

WOMEN'S SHOES (Un-hin). Uppers of blue cloth, lined with ass skin; bound with white leather; soles, rawhide. White leather scrolls ornament toe and heel. Neatly finished and ornamented. Pl. XX, fig. 1, lower line (commencing at the left).

Length, 8½ inches.
Seoul, Korea, 1885. 77016
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by all ladies, except widows.

'INTER HOOD (Nam-pa-oui). Purple, brocaded silk, lined with scarlet felt and trimmed on edges with black fur. Open at top. Pl. XIX, fig. 1, middle line (commencing at the left).

Width, 15 inches.
Seoul, Korea, 1885. 77080
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by women, young ladies, and children in winter. A similar hood is worn by men under the hat.

ADY'S HOOD (Nam-ba-we). Changeable, green silk, lined with woolen stuff. Trimmed around the lower edge with black fur. Red cord with fringed ends at the top.

Length, 14 inches.
Seoul, Korea. 130856
Collected by Dr. H. N. Allen.
Worn by young ladies and children in winter to protect them from cold. Men sometimes wear a similar hat covered with black cloth. This style came into use a number of years ago.

MEN'S COSTUMES.

The following specimens are of summer clothing, differing from the rinter garments in not being padded with raw cotton:

NNER JACKET (Tjök-sam). Of coarse cotton, with rolling collar and two pairs of tying strings. Sleeves large and square, with gussets in the armpits.

Length, 31½ inches.
Seoul, Korea, 1885. 77110
Collected by Ensign J. B. Bernadou, U. S. Navy.

TROUSERS (Pa-tji). White cotton, lined with coarser material. Very large. Held up by the girdle, over which the superfluous upper part of the garment falls.

Waist, 52 inches; length, 4½ feet.
Seoul, Korea, 1885. 77197
Collected by Ensign J. B. Bernadou, U. S. Navy.

GIRDLE (Yotai). Green grosgrain ribbon folded over and fringed at both ends. Fastened around the waist above the hips to hold up the trousers.

Width, 2¼ inches; length, 60 inches.
Seoul, Korea, 1885. 77095
Collected by Ensign J. B. Bernadou, U. S. Navy.

GARTERS (Tai-nam). Narrow, green grosgrain ribbon; fringed. Tied around the bottom of the trousers.

Length, 24 inches.
Seoul, Korea, 1885. 77092
Collected by Ensign J. B. Bernadou, U. S. Navy.

STOCKINGS (Po-syön). White cotton; seam running through the toe and heel. Padded with raw cotton; the rigidity of the Korean shoe renders this necessary.

Length, 9½ inches; height, 12 inches.
Seoul, Korea, 1885. 77098
Collected by *Ensign J. B. Bernadou*, U. S. Navy.

LEGGINS (Haing-tjyön). White cotton; hems pasted down. Tying strings fastened around the calf, covering the junction of the trousers and stockings.

Length, 10 inches; width, 8 inches.
Seoul, Korea, 1885. 77096
Collected by Ensign J. B. Bernadou, U. S. Navy.

OUTER ROBE (Syo-tjang-ot). Thin pongee silk. Has a straight slash on each side from the armpits down, dividing the garment into three nearly equal panels; hemmed. Collar, a long rolling yoke; flowing sleeves; strings tied in a bow on right side.

Length, 54 inches.
Seoul, Korea, 1885. 77099
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by men in summer under the outer garment.

OUTER COAT (To-pou). Ample robe of mosi or grass cloth; gored skirt; flowing sleeves. Divided up the center of the back to just below the shoulder blades. This division is covered over by a free panel hanging from the neck and going over the shoulders. The robe is hemmed all around, the gored seams felled; where the goods would be subjected to strain these points are stitched and corded. Needlework, quite good.

Length, 56 inches; sleeves, 27 by 22 inches.
Seoul, Korea, 1885. 77105
Collected by Ensign J. B. Bernadou, U. S. Navy.

GIRDLE (Theui). Long, round cord of green silk, with tassels. It gathers in the to-pou or robe at the waist; the tassels hang down in front.

Length, 98 inches.
Seoul, Korea, 1885. 77082
Collected by Ensign J. B. Bernadou, U. S. Navy.

CUFFS (To-syou). Green silk, lined with coarse cotton; gored to make the upper end wider. Simply worn slipped over the wrists. Excellent needlework. Worn by men in cold weather.

Length, 11 inches.
Seoul, Korea, 1885. 77083
Collected by Ensign J. B. Bernadou, U. S. Navy.

MAN'S SHOES (Sin). Black felt, lined with white leather. The lower edge of the upper is flared out, the sole put on and sewed to the upper with wide stitches. Space between sole and insole filled with layers of cotton cloth, as in Chinese shoes; edge of sole coated with white size. Hobnails on heel. Pl. XX, fig. 1, middle line (commencing at the left).

Length, 8 inches.
Seoul, Korea, 1885. 77014
Collected by Ensign J. B. Bernadou, U. S. Navy.
The regular shoe worn by men of the upper class. It is very rigid, and necessitates the wearing of padded stockings.

EXPLANATION OF PLATE XVIII.

KOREAN MOURNING HEAD-DRESSES AND FARMERS' HAT.

(Upper line, commencing at the left.)

Fig. 1. MOURNING CAP. Coarse hemp cloth; wedge-shaped; made like a grocers' paper bag, of a single piece of cloth. Height, 7¾ inches; diameter, 7½ inches. (Cat. No. 77089, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. MOURNING HAT. A plaited band of coarse hemp cloth; stiffened; lined with paper; bent into a peak. A narrow strip of cloth forms the head band; the ends of this strip hang free below the chin. Height, 13 inches. (Cat. No. 77085, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. MOURNER'S HAT. Woven of bleached split bamboo. The shape of the national hat. Height, 4¾ inches; diameter, 15¾ inches. (Cat. No. 77064, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

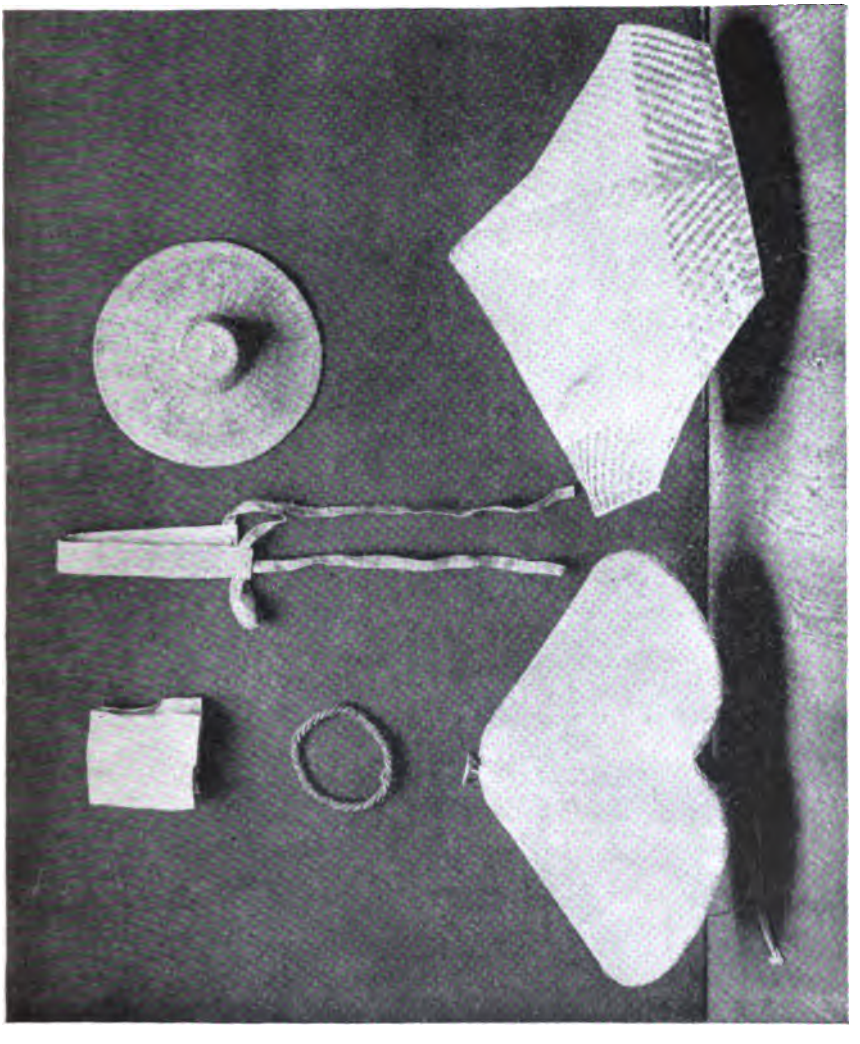
(Middle line.)

Fig. 1. MOURNER'S HEAD RING. Two strands of rice straw, covered with unhackled hemp, twisted together to form a ring. Diameter, 6½ inches. (Cat. No. 77088, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Lower line, commencing at the left.)

Fig. 1. MOURNER'S HAT. Neatly braided, of bamboo splints; edges scalloped and finished off with braiding. Rosette of bamboo at apex. A frame to fit over the head is fastened inside. Height, 14½ inches; diameter, 25 inches. (Cat. No. 77066, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. FARMER'S HAT. Woven from split millet stalks, showing geometrical patterns made by contrast in color of the different sides of the straw. The weaving is finished at the apex without showing a break. Braced with hoops and ribs of bamboo. Outline hexagonal. Height, 16 inches; diameter, 30 inches. Area, 6 square feet. (Cat. No. 77065, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN MOURNING HEADDRESSES AND FARMER'S HAT.

EXPLANATION OF PLATE XIX.

KOREAN HATS, SHOES, ETC.

(Upper line, commencing at the left.)

Fig. 1. COURT HAT. High, terraced crown, made of stiff, lacquered paper and woven bamboo, covered with black sateen. On either side at the back are attached curved, oar-shaped, gauze wings, which project horizontally forwards. Height, 7 inches. (Cat. No. 77063, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. NATIONAL HAT. Made of fine silk, worn over a bamboo framework, stiffened with size. Small, cylindrical, truncated crown; broad brim; long tying strings. Superior handiwork. Height of crown, 4½ inches; diameter of brim, 18 inches. (Cat. No. 77060, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. CAPS. Wide circular band of black horsehair, neatly woven. Height, 7½ inches. (Cat. No. 77115, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Middle line, commencing at the left.)

Fig. 1. WINTER HOOD. Purple brocaded silk, lined and trimmed on edge with fur. Open at top. Width, 15 inches. (Cat. No. 77080, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. EXAMINATION CAP. Of one piece of coarse black cotton stuff, shaped like a grocer's paper bag. Height, 9 inches; diameter, 7 inches. (Cat. No. 77057, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. CAP. Black horsehair, woven in the shape of the court hat. Height, 7 inches. (Cat. No. 77056, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

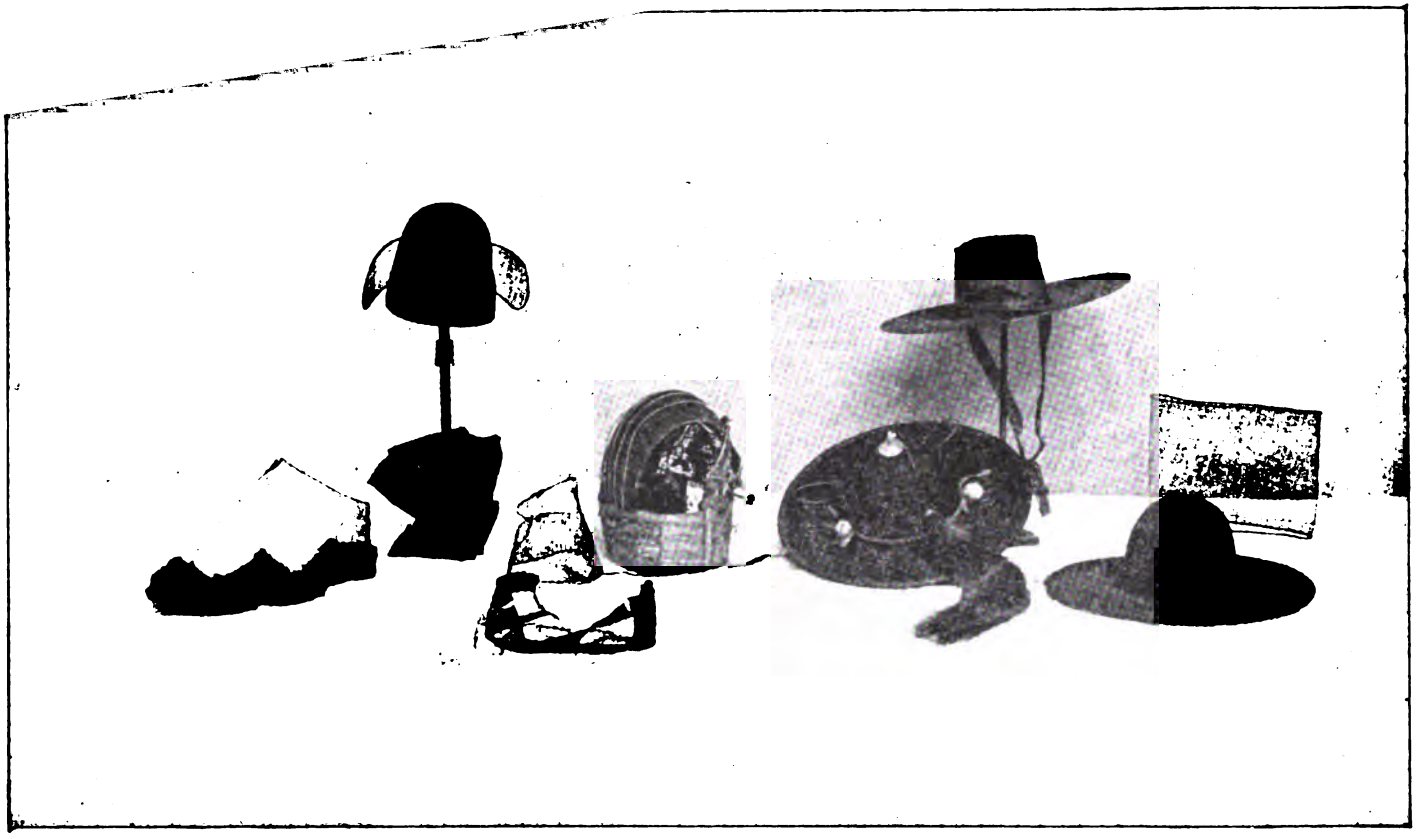
Fig. 4. CEREMONIAL HAT. Helmet-shaped; back, shield-shaped; woven of thin slivers of bamboo incrusted with gilt papier-mâché dragons, scrolls, etc. Front, black sateen, curving backwards and spaced by vertical gilt wires. Wooden pin runs through back portion of hat. Height, 10 inches. (Cat. No. 77062, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 5. SOLDIER'S HAT. Thick, black, stiffened felt, mixed with horsehair, which shows on the outside. Band, a red cord, with tassels, and tail buttons carved with the national symbol, attached. A long switch of horsehair dyed red is fastened in the crown by a swivel button. Height, 5 inches; diameter, 15 inches. (Cat. No. 77058, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 6. CHAIR COOLIE'S HAT. Black stiffened felt; smooth surface. Shaped like the soldier's hat. Height, 4 inches; diameter, 15 inches. (Cat. No. 77061, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Lower line,)

Fig. 1. HEAD BAND. Skillfully woven of horsehair, with drawstrings and two tying strings. On the front is a piece of substance resembling amber, which prevents the hat from slipping down. Length, 19½ inches; width, 3 inches. (Cat. No. 77112, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN HATS, SHOES, ETC.

EXPLANATION OF PLATE XX.

KOREAN FOOT WEAR.

(Upper line.)

Fig. 1. RAIN CLOGS. Boat-shaped; cut from blocks of light coarse-grained wood. Short supports raise the foot about 4 inches from the ground. Length 11 inches. (Cat. No. 77015, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Middle line, commencing at the left.)

Fig. 1. MAN'S SHOES. Black felt, lined with white leather. The lower edge of the upper is flared out, the sole put on and sewed to the upper with wide stitches. Sole, padded with layers of cotton cloth, as in Chinese shoes. Hobnails on heel. Length, 8 inches. (Cat. No. 77014, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

FIG. 2. TRAVELER'S SANDALS. Sole, four wisps of straw woven together with cotton rags, fastening in the strand which forms the uppers. Length, 10 inches. (Cat. No. 77011, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. MOURNER'S SANDALS. Twisted rice straw; white paper wound around the heel yoke and drawing string. They differ from the common straw sandal by the paired arrangement of the straw cords which go over the sides of the foot. Length, 10 inches. (Cat. No. 77012, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 4. SANDALS. Rice straw; shape, between a shoe and a sandal; covering the sides of the foot and open above. Length, 10½ inches. (Cat. No. 77013, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

(Lower line, commencing at the left.)

Fig. 1. WOMEN'S SHOES. Uppers of blue cloth, lined with ass skin; bound with white leather; soles, rawhide. White leather scrolls ornament toe and heel. Neatly finished and ornamented. Length, 8¼ inches. (Cat. No. 77016, U. S. N. M. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. CHILD'S SHOES. Red leather, with green and yellow leather foxings. Upper and sole joined together from outside. Length, 6½ inches. (Cat. No. 77081, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

KOREAN FOOT-WEAR.

HEAD BAND (Mang-kŏn). Skilfully woven of horsehair, with drawstring and two tying strings. On the front is a piece of a substance resembling amber, which prevents the hat from slipping down. Pl. XIX, fig. 1, lower line (commencing at the left).

Length, 19¼ inches; width, 3 inches.
Seoul, Korea, 1885. 77112
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn around the head to keep the loose hair in order. It may be the analogue of the fillet of bark or leaves worn by the ancient Japanese and Chinese for the same purpose, and now often worn by the Koreans. High officials wear a button of gold or jade on the head band.

MOURNER'S COSTUMES.

The mourning customs of Korea are regulated to the minutest detail by the Chinese Book of Rites, the Sa-ryei-pyellam, a compilation of the burdensome rules that should govern, coming of age, marriage, death and burial, and the worship of the dead. The two latter are very full. The portion of the book laying down the mortuary customs is translated in Ross' Korea.

The two years' mourning period required on the death of parents is governed in such a way that it amounts to hermit-like seclusion of the producing members of society. The mourner hides his face, and sits literally in "sackcloth and ashes," and his labor is a loss to the state for two years.

MOURNING CAP (Tou-ken). Hemp cloth; wedge-shaped; made somewhat like a grocer's paper bag of a single piece of coarse stuff. Pl. XVIII, fig. 1, upper line (commencing at the left).

Height, 7¾ inches; diameter, 7¼ inches.
Seoul, Korea, 1885. 77089
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn on special mourning occasions.

MOURNING HAT (Koul-kŏn). Plaited band of coarse hemp cloth; stiffened; lined with paper. This band bent into a peak forms the crown. A narrow strip of cloth forms the head band; the ends of this strip hang free below the chin. Pl. XVIII, fig. 2, upper line (commencing at the left).

Height, 13 inches.
Seoul, Korea, 1885. 77085
Collected by Ensign J. B. Bernadou, U. S. Navy.
The outer of the three headdresses (77089, 77085, and 77088). Worn on special mourning occasions, such as the day of a death; after the decease of a parent; at the time of burial, and at the expiration of the first and second years after a death.

MOURNER'S HAT (Pyo-rang-i). Woven of bleached, split bamboo. Shape of the national hat. Pl. XVIII, fig. 3, upper line (commencing at the left).

Diameter, 15¼ inches; height, 4¾ inches.
Seoul, Korea, 1885. 77086A

MOURNER'S HAT—Continued.

Collected by Ensign J. B. Bernadou, U. S. Navy.

This hat has a special use in mourning, being worn by a son before the burial of a deceased parent; worn also by adopted sons in mourning for their real parents. Otherwise, it is used by chair coolies and government slaves. The members of the peddler guild fasten small pieces of raw cotton at intervals around the base of the crown.

MOURNER'S HEAD RING (Tei-tou-ri). Two strands of rice straw covered with unhackled hemp twisted together to form a ring. Pl. XVIII, fig. 1, middle line (commencing at the left).

Diameter, 6½ inches.
Seoul, Korea, 1885. 77088
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn in mourning for some distant relative.

MOURNER'S HAT (Pang-gat). Well made of bamboo splints; edges scalloped and finished with braiding. Crowned at apex with rosette of bamboo. A frame to fit over the head is fastened inside and from it hang tying strings of twisted paper. Pl. XVIII, fig. 1, lower line (commencing at the left).

Diameter, 25 inches; height, 14½ inches.
Seoul, Korea, 1885. 77066
Collected by Ensign J. B. Bernadou, U. S. Navy.

This hat is designed to hide the face, as it is considered a grievous breach of etiquette to look into the face of the mourner. Taking advantage of this custom before Korea was opened to foreigners, missionaries disguised themselves as mourners and lived and taught there for a long time without detection.

MOURNER'S HEAD BAND (P'omang). Woven of hemp threads; white tying cords. Same shape as ordinary head band; no button in front.

Length, 23 inches; width, 2 inches.
Seoul, Korea, 1885. 77091
Collected by Ensign J. B. Bernadou, U. S. Navy.

This band takes the place during mourning of the otherwise invariable *mang-kŏn* or head band.

OUTER MOURNING ROBE (Simeni). Hemp cloth, finer in quality than that of the inner robe. Sleeves wide; made in two pieces.

Length, 4 feet.
Seoul, Korea, 1885. 77084
Collected by Ensign J. B. Bernadou, U. S. Navy.

MOURNING ROBE (Tjoung-tou). Inner robe of very coarse hemp cloth (sackcloth); back, a straight piece; two gores at each side extending from the armpits down; front, a straight piece and a gore. Sleeves, square; collar, rolling; two tying strings.

Length, 4 feet.
Seoul, Korea, 1885. 77083
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by men under the *simeni*.

Regular mourning costume made after a fixed ceremonial pattern and worn by a son for two years after the decease of a male parent.

GIRDLE (Sam-di). Rope of unhackled hemp, with loop and knot. The girdle passed around the body, the knot hitched through the loop and the end secured.

Length, 71 inches.
Seoul, Korea, 1885. 77090
Collected by Ensign J. B. Bernadou, U. S. Navy.
The girdle is worn upon the occasion of the death of a father. After the death of his mother the Korean wears a strip of hemp cloth as a girdle instead.

MOURNING HAND SCREEN (Posŏn). Of two thicknesses of hemp cloth, fastened between two rods also covered with cloth. A thin strip connects the rods at the lower ends.

Width, 13¼ inches.
Seoul, Korea, 1885. 77087
Collected by Ensign J. B. Bernadou, U. S. Navy.
Carried by the mourner, held before the face while out of doors.

MOURNER'S LEGGINS (Be-haing-tyen). Brown hemp cloth; hemmed.

Length, 9¼ inches.
Seoul, Korea, 1885. 77086
Collected by Ensign J. B. Bernadou, U. S. Navy.

MOURNER'S SANDALS (Ŏm-jip-séki). Twisted rice straw; white paper wound around the heel yoke and drawing string. They differ from common sandals by the paired arrangement of the straw cords which go over sides of the foot. Pl. XX, fig. 3, middle line (commencing at the left).

Length, 10 inches.
Seoul, Korea, 1885. 77012
Collected by Ensign J. B. Bernadou, U. S. Navy.

ACCESSORIES OF DRESS. HATS, SHOES, ETC.

COURT HAT (Samo). High, terraced crown, made of stiff lacquered paper and woven bamboo covered with black satteen. It fits tightly over the forehead and on either side at the back are attached curved oar-shaped gauze wings, which project horizontally forward. Pl. XIX, fig. 1, upper line (commencing at the left).

Height, 7 inches.
Seoul, Korea, 1885. 77063
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by men of the upper and middle class at the marriage ceremony. The wings of the King's *samo* are vertical. Grades of rank are marked by thickness of the wings: being two-ply instead of single in higher grades. Compare the Japanese official hat. Civil officers wear this hat at an audience, on New Year's day, on the King's birthday, or on a formal visit of congratulation. The rings at the side are for attaching flowers at a particular banquet given by the royal family.

NATIONAL HAT (Kat). Made of fine silk over a bamboo framework; stiffened with size. Small, cylindrical, truncated crown; broad brim; long tying strings. Superior handiwork. Pl. XIX, fig. 2, upper line (commencing at the left).

NATIONAL HAT—Continued.

Diameter of brim, 18 inches; height of crown, 4¼ inches.
Seoul, Korea, 1885. 77060
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by all classes in Korea, indoors and out. It does not fit over the head, but is placed on the crown and held in position by the tying strings.

CAP (Kön). Wide, circular band of black horsehair. Pl. XIX, fig. 3, upper line (commencing at the left).

Height, 7¼ inches.
Seoul, Korea, 1885. 77115
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by those of the literary class who have not as yet passed examinations or held office; also allowed to any one who passes the second grade in merit at the literary or military examinations before holding office. The lower class of merchants and laborers, unless after such examinations, can not wear it.

EXAMINATION CAP (Yu-kön). Of one piece of coarse, black, cotton stuff, shaped like a grocer's paper bag. Pl. XIX, fig. 2, middle line (commencing at the left).

Height, 9 inches; diameter, 7 inches.
Seoul, Korea, 1885. 77057
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by students only at the literary examinations, which are held yearly for the preliminary grade. This style of cap is reputed to be made in the shape of the mountain near which Confucius was born. It was introduced from China several centuries ago, probably during the Ming dynasty.

CAP (T'ang-kön). Black horsehair woven in the shape of the court hat. Weaving barred; that is, the weaving is so disposed as to leave oblong reticulations. Pl. XIX, fig. 3, middle line (commencing at the left).

Height, 7 inches.
Seoul, Korea, 1885. 77056
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by all officers in government service and by those who have passed the first grade in the literary and military examinations. It is worn when at home or indoors by all officers, a few of the lower grades of attendants at the "yamouns" or official houses, such as upper policemen, being alone excepted.

CEREMONIAL HAT (Keum-kön). Helmet-shaped. Back, shield-shaped; woven of thin slivers of bamboo incrusted with gilt papier-mâché dragons, scrolls, etc. Front, black satteen, curving backward and spaced by vertical gilded wires. The front band has a decorated panel. Head rim adjustable; tied with blue silk cords. A large wooden pin, with cord and tassel, is thrust through the sides of the back portion of the hat. Pl. XIX, fig. 4, middle line (commencing at the left).

Height, 10 inches.
Seoul, Korea, 1885. 77062
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn upon the occasion of the King's offering sacrifices, by those who assist him in the ceremony. A similar hat, not gilded, is worn by those officiating at the semi-annual sacrifices to Confucius. These are offered throughout Korea in all districts governed by magistrates.

CEREMONIAL HAT (Keum-kŏn). Helmet-shaped, framed of bamboo, silk, and paper. Covered with black silk. Rim and shield-shaped back incrustation of paper. Design, the dragon; gilded. Open at each side of the crown, which curves backward and is spaced with five gilt wires. A wooden pin is thrust through the back of hat and ornamented with blue silk cord.

Height, 9¼ inches.
Seoul, Korea, 1884. 151637
Collected by P. L. Jouy.

With this hat is worn a red-silk gown partially embroidered. All officers, civil or military, above the ninth rank (or chief clerk of any office in the United States) don this style of dress on the 1st of January, when there is an audience with the King. It is also worn at times of thanksgiving or congratulation of the royal family. (See No. 77062).

SOLDIERS' HAT (Pang-ko-tji). Thick, black, stiffened felt, mixed with horsehair, which shows as a mat on the outside. Resembles a sombrero. Band, a red cord with tassels and two carved talc buttons attached. A long switch of horsehair dyed red is fastened in the crown by a swivel button. Pl. XIX, fig. 5, middle line (commencing at the left).

Diameter, 15 inches; height, 5 inches.
Seoul, Korea, 1885. 77058
Collected by Ensign J. B. Bernadou, U. S. Navy.

The hat is heavy and resembles the Japanese pot helmet (kabuto); probably it is made thick for defense. The plume (syang-mo) is the distinctive badge of soldiers. Koreans say that this ornament and the sleeves of the cavalry soldiers are dyed red in order to accustom the horses to the sight of blood. Some of the troops still wear these hats.

CHAIR COOLIES' HAT (Pong-ko-tji). Black, stiffened felt; smooth surface. Shaped like the soldiers' hat. Pl. XIX, fig. 6, middle line (commencing at the left).

Height, 4 inches; diameter, 15 inches.
Seoul, Korea, 1885. 77061
Collected by Ensign J. B. Bernadou, U. S. Navy.

Worn by chair coolies, hostlers, and road runners who accompany noblemen when on a journey.

HAT IN BOX (Bung-gu-gi). Woven by hand of bamboo splits, horsehair, and silk thread. The hat boxes are made from splints of bamboo covered with oiled paper.

Height, 5½ inches.
Seoul, Korea. 151628
Collected by P. L. Jouy.

Made after the European style at the time when the Progressive Party attempted to introduce European dress and manners. It was the custom of the King to present these hats to foreigners for criticism.

BEADS WORN ON HAT (Gum-ga-kat-gŭn). Imitation amber beads and bugles strung on a cord alternately.

Length, 66 inches.
Seoul, Korea. 130868
Collected by Dr. H. N. Allen.

Worn *for ornament by officers; suspended* from one side of the hat.

FARMERS' HAT (Kat-si). Woven of split stalks of millet, showing geometrical patterns made by the different sides of the straw. The weaving is closed at the apex of the hat without showing a break. Braced inside with hoops of bamboo and ribs running from the apex to points on the edge. In the top is a frame to fit around the head. Outline, hexagonal. Pl. XVIII, fig. 2, lower line (commencing at the left).

Height, 16 inches; diameter, 30 inches; area, 6 square feet.
Seoul, Korea, 1885. 77065
Collected by Ensign J. B. Bernadou, U. S. Navy.

HAT COVER (Kanno). Polygonal cone of oiled paper; folding. String of twisted white paper crossed under the chin and held in the hand.

Length, 13 inches.
Seoul, Korea, 1885. 77019
Collected by Ensign J. B. Bernadou, U. S. Navy.
This cover is sometimes worn over a light frame of bamboo sticks which serve as a support instead of the hat. When not in use the cover is folded up like a fan and put in the sleeve. This is an interesting form of the umbrella.

RAIN COAT (You-sam). Oiled paper; simply made; large sleeves. The sesamum oil is applied after the coat is made.

Length, 4 feet.
Seoul, Korea, 1885. 77017
Collected by Ensign J. B. Bernadou, U. S. Navy.
Straw rain coats like those used in China and Japan are also used in Korea. Worn by men of the serving class.

RAIN CLOGS (Namack-sin). Boat-shaped clogs, cut out of blocks of light, coarse-grained wood. Short supports raise the foot about 4 inches from the ground. Pl. XX, fig. 1, upper line (commencing at the left).

Length, 11 inches.
Seoul, Korea, 1885. 77015
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn on muddy ground by poor people. Compare the Japanese rain clogs.

SWEAT SHIELD (Dung-dung-gu-ri). Bamboo openwork device, worn by men under the clothes to prevent their becoming damp. Consists of three panels, the larger going over the chest and the smaller over the shoulders. Folding; very good workmanship.

Length, 16 inches; width, 13 inches.
Seoul, Korea, 1885. 77028
Collected by Ensign J. B. Bernadou, U. S. Navy.

CUFFS (Dung-to-su). Openwork cuffs of bamboo coils wound with rattan. Worn by men to prevent sleeves at wrist becoming damp from perspiration.

Length, 7 inches.
Seoul, Korea, 1885. 77029
Collected by Ensign J. B. Bernadou, U. S. Navy.

TRAVELERS' SANDALS (Chip-seki). Sole, four wisps of rice straw, woven together with cotton rags, fastening in the strands which form the uppers. These strands cover only the sides of the foot in the front portion. The heel turns sharply up, bearing a yoke which fits over the back of the heel. Gathering string of grass. Worn by farmers. Pl. XX, fig. 2, middle line (commencing at the left).

Length, 10 inches.
Seoul, Korea, 1885. 77011
Collected by Ensign J. B. Bernadou, U. S. Navy.

SANDALS (Sang-jip-sin). Rice straw; shape, somewhat between a shoe and sandal; covering the sides of the foot and open above. Pl. XX, fig. 4, middle line (commencing at the left).

Length, 10¼ inches.
Seoul, Korea, 1885. 77013
Collected by Ensign J. B. Bernadou, U. S. Navy.
Worn by farmers, laborers, etc. These sandals do not wear long, so it is customary to carry several pairs for a long journey afoot. They cost only a few mills a pair.

TOILET ARTICLES AND ACCESSORIES.

TWEEZERS (Tjök-tjip-kei). Brass strip; rudely bent.

Length, 2 inches.
Seoul, Korea, 1885. 77051
Collected by Ensign J. B. Bernadou, U. S. Navy.
Carried in the chon-möni or toilet bag.

POCKET MIRROR (Kyol). Silvered glass set in a wooden frame, with a pivoted lid. Frame, stained red.

Size, 2¼ by 2¼ inches.
Seoul, Korea, 1885. 77049
Collected by Ensign J. B. Bernadou, U. S. Navy.
One of the toilet articles usually carried by every Korean man and boy.

COMB CLEANER. Thin strip of horn, pointed, and with a shield-shaped head.

Length, 4 inches.
Seoul, Korea, 1885. 77115
Collected by Ensign J. B. Bernadou, U. S. Navy.
The point is used to clean the comb and the head to apply paint to the face by Korean ladies.

HAIR-ARRANGER. Thin strip of horn with rounded ends, bent slightly in the middle. Used to push back stray locks under the head band.

Length, 4¼ inches.
Seoul, Korea, 1885. 77048
Collected by Ensign J. B. Bernadou, U. S. Navy.

COARSE COMB (Ör-öm-pit). Hard wood; made by hand.

Length, 3¼ inches; width, 2¼ inches.
Seoul, Korea, 1885. 77044
Collected by Ensign J. B. Bernadou, U. S. Navy.

FINE COMB (Tchom-pit). Double; made of thin slivers of bamboo fastened between cleats of the same material.

Length, 3¾ inches; width, 2 inches.
Seoul, Korea, 1885. 77045
Collected by Ensign J. B. Bernadou, U. S. Navy.
All classes give great attention to the care of the hair. Every man and boy carries a comb in the small bag hung at the waist.

COMB (Chom-pit). Fine teeth of bamboo held in series by cleats of bamboo.

Length, 3¾ inches; width, 1⅝ inches.
Seoul, Korea. 130858
Collected by Dr. H. N. Allen.

COMB BOX (Bid-jub). Oblong wooden box with lid and drawer; covered with a geometric veneer of different-colored pieces of bamboo.

Dimensions, 5⅜ by 4⅜ by 2½ inches.
Seoul, Korea. 151615
Collected by P. L. Jouy.
Used by men to hold combs and a sheet of oiled paper, on which are collected combings, which are carefully burned once a year.

HAIR PIN (Ok-jam). Green jade. The head of the pin is elegantly carved in openwork with leaves and flowers.

Length, 5⅜ inches.
Seoul, Korea. 130875
Collected by Dr. H. N. Allen.
The jade is imported from China and worked in Korea. These small pins are generally worn by elderly ladies.

EAR SPOON CASE (Chu-e-jib). Hexagonal tube of precious white jade, the sides finely fretted with floriated designs. Generally carried by ladies.

Length, 3¾ inches.
Seoul, Korea. 130872
Collected by Dr. H. N. Allen.

EAR SPOON CASE (Chu-e-jib). Hexagonal tube of precious white jade; the sides in fretwork carving, like No. 130872. Suspended by silk cord.

Length, 3⅛ inches.
Seoul, Korea. 130873
Collected by Dr. H. N. Allen.
Receptacle for ear spoons and toothpicks.

HAIR ORNAMENT (Mang-ja-sug-ung-hwang). Oblong bead, flattened on one side. Made of realgar or red sulphide of arsenic.

Length, 2½ inches; width, 1¾ inches.
Seoul, Korea. 128122
Presented by C. G. Talcott, U. S. Navy.
Worn by ladies, with the exception of widows and those in mourning. Good quality; valued for its color and electrical properties, in which it resembles amber.

HAIR ORNAMENT (Da-chu-su-quang). Date-shaped head of clay, painted red in imitation of realgar.

Length, 1⅛ inches; width, ⅝ inch.
Seoul, Korea, 1884. 77050
Collected by Ensign J. B. Bernadou, U. S. Navy.
The specimen is attached to a strip of black silk designed to be twisted with the queue, which boys are compelled to wear until 15 years old.

ORNAMENTAL KNIFE (Jang-do). No blade. Handle of amber with silver-gilt fittings. Suspended by a silk cord with tassel.

Length, 5 inches.
Seoul, Korea. 130870
Collected by Dr. H. N. Allen.
Worn by ladies as an ornament.

ORNAMETAL KNIFE (Jang-do). No blade. Handle of white jade; fittings of silver gilt.

Length, 7¾ inches.
Seoul, Korea. 130869
Collected by Dr. H. N. Allen.
Worn by men as an ornament.

KNIFE AND CHOPSTICKS (Jang-do). Square handle and sheath of dark-brown hard wood (san-u-ja). Iron blade; German silver fittings.

Length, 6½ inches.
Tong-na, Korea. 151609
Collected by P. L. Jouy.

PENKNIFE. One blade of soft iron; wooden handle; brass end clips engraved with dragon's head; no spring; the nail depression is in the curving end of the blade.

Length, open, 6 inches.
Seoul, Korea, 1885. 77043
Collected by Ensign J. B. Bernadou, U. S. Navy.
Korean cutlers do not make their wares on a fixed pattern in any numbers; that is, they will not take an order for 1 dozen knives made after a certain style.

POCKET KNIFE AND TWEEZERS (Ju-mu-ni-pal-qua-jok-juk-ga). Two blades; iron and brass; horn handle; brass spring. The tweezers slip over the outside of the handle.

Length, closed, 3¼ inches.
Seoul, Korea. 151611
Collected by P. L. Jouy.

SCENT BAG (Hiang-nang). Red satin embroidered with flowers, etc., and lined with blue satin. Mouth drawn up with a silken string.

Length, 3¼ inches; width, 4½ inches.
Seoul, Korea. 130865
Collected by Dr. H. N. Allen.
Used by young men for holding spices or medicine. Made by the court ladies for distribution by the King and Queen to their relatives.

SMALL SCENT BAG (Ha-rang). Yellow satin, embroidered in bright colors. Mouth drawn together with a silk cord.

Diameter, 2 inches.
Seoul, Korea, 130866
Collected by Dr. H. N. Allen.
Given to the children of the royal families on New Year's day. Made by the ladies in the palace.

BELT CLASP (Di-don). Precious white jade; oblong; fine perforated carving of the dragon.

Length, 2¼ inches; width, 1¼ inches.
Seoul, Corea. 130874
Used by officers in uniform to fasten a bunch of silk covering an ivory tablet, on which are engraved their name, rank, etc.

FOLDING FAN (Sun-ja). Bamboo sticks covered with paper; not decorated. The outside sticks are strengthened by a piece of hard wood set in at the rivet end.

Length, 10 inches.
Seoul, Korea, 1885. 77020
Collected by Ensign J. B. Bernadou, U. S. Navy.
Korean fans are noted for their strength and durability.

FAN (Tei-eul-sĕn). Rigid fan of bamboo splints covered with varnished oiled paper, set into a black lacquered handle. Decorated with the Korean national symbol (a pair of red and black, comma-shaped spirals coiled together in a circle) emblematic of the positive and negative essences of Chinese philosophy.

Length, 13 inches.
Seoul, Korea, 1885. 77021
Collected by Ensign J. B. Bernadou, U. S. Navy.
Carried by the better class of Korean women.

FANS (Bu-cha). Paper on bamboo; folding. Lacquered sticks burned in figures. Paper oiled to render it more durable.

Length, from 10 to 16½ inches.
Seoul, Korea. 1308
Collected by D. H. N. Allen.
Folding fans are generally carried by men. The smaller fans are for carrying in the pocket or sleeve, but the large fans are used by servants to fan their masters. The large fans are not made for trade, but are the annual tribute from the southern provinces and are distributed by the King to the high officers in Seoul.

LADIES' FAN (Mi-sun). Rigid fans covered with oiled paper; round and other shapes, with black lacquer handle.

Diameter, 9½ inches.
Chŏlla-do, Korea. 130849
Collected by Dr. H. N. Allen.

WOMAN'S MAT. Sheet of red oiled paper, stamped with white figures, folded into a square form.

Seoul, Korea. 153612
Collected by Ensign J. B. Bernadou, U. S. Navy.
The purpose of this mat is to catch the hair and bits of nail, which are carefully collected and burned once a year in accordance with a widespread custom.

PIPE BOWL AND MOUTHPIECE. Of white metal; stem, straight piece of bamboo about a yard long, cleared of divisions by a long iron drill.

Seoul, Korea, 1885. 77041
Collected by Ensign J. B. Bernadou, U. S. Navy.
Koreans are reported to be inveraie smokers. "A little pouch is even hung to the girdle of children, significant of their future proficiency in smoking," writes the author of Chosŏn. Mr. Rockhill has found them reckoning time by pipes of tobacco. The pipe is much larger than that of the Japanese.

PIPE BOWL AND MOUTHPIECE. Of brass; large bowl.

Seoul, Korea, 1885. 77040
Collected by Ensign J. B. Bernadou, U. S. Navy.

TOBACCO BOX (Tam-pai-ho-rap). Oblong, rectangular box of precious serpentine of dark-green color, with yellow mottlings; lid and box highly polished. Two compartments for holding different kinds of tobacco. Pl. XXI, fig. 1 (commencing at the left).

Length, 6½ inches; width, 4⅛ inches; height, 4⅛ inches.
Seoul, Korea. 130846
Collected by Dr. H. N. Allen.

TOBACCO BOX (Tam-pai-ho-rap). Oblong rectangular box finely wrought from green serpentine. With cover. Highly polished. Pl. XXI, fig. 2 (commencing at the left).

Length, 6½ inches; width, 4⅛ inches; height, 4½ inches.
Dan chun City, Korea. 130845
Collected by Dr. H. N. Allen.

INLAID TOBACCO BOX (Tam-pai-ho-rap). Rectangular iron box inlaid with silver; sliding lid; bolt for fastening; staple through which a strap passes for carrying. The method of inlaying pursued is to hack the surface of the iron, lay on the wire design and fasten with pressure and hammering. The wide inlays are engraved. Pl. xxi, fig. 3 (commencing at the left).

Size, 4x2⅜x2¼ inches.
Seoul, Korea, 1885. 77038
Collected by Ensign J. B. Bernadou, U. S. Navy.
Design on the lid is Sang-hi, "Long life and happiness" character; on end mythological design of stork and tortoise; on sides deer browsing on leaves; the dead spaces matted with stars and four-petaled flowers; borders of Grecian and other designs. The Korean silver inlaying is excellent and well-known art work.

TOBACCO BOX (Tam-pai-ho-rap). Circular box with lid; made of a soft reddish soap stone called hua-ban-suk. Turned on a reciprocating lathe and polished with stone dust, a rough equisetaceous plant (sok-sa), and oil. Pl. XXI, fig. 4 (commencing at the left).

Height, 3½ inches; diameter, 4⅛ inches.
Fusan, Korea, 1884. 151617
Collected by P. L. Jouy.

TOBACCO BOX. Iron inlaid with copper filature. Circular, with lid. The iron is first made rough by filing or hacking and the wire design laid on and hammered down and the whole burnished and polished. Very fine work. Designs, plum bloom, bamboo, pine, chrysanthemum, birds, and insects. The lid bears "Good luck" character. Pl. XXI, fig. 5 (commencing at the left).

Height, 3 inches; diameter, 4 inches.
Seoul, Korea, 1885. 77039
Collected by Ensign J. B. Bernadou, U. S. Navy.
The subjects of design have their significance in the folk-lore of Korea as in Japan.

TOBACCO BOX (Tam-pai-ho-rap). Circular iron box with lid. Inlaid with silver filatures and lacquered in the interspaces. Side ornamented with archaic Chinese characters; reserve spaces filled with a mat fret design. Happiness character on the lid. Pl. XXI, fig. 6 (commencing at the left).

Height, 2¾ inches, diameter, 4 inches.
Seoul, Korea. 15161
Collected by P. L. Jouy.

PIPE (Dam-be-ta). Bowl and mouthpiece of an alloy like German silver, decorated with niello work. Stem etched and lacquered.

Fusan, Korea. 130847
Collected by Dr. H. N. Allen.

TOBACCO (Tam-pe). Dark-yellowish color; cut quite fine. Not very strong.

Seoul, Korea, 1884. 151639
Collected by P. L. Jouy.
This specimen is called sucho and is not of good quality. Korean tobacco is said to be suitable for the European market.

SNUFF BOTTLE (Bee-yun-tong). Small flat bottle with neck; made of smoky agate.

Height, 2½ inches.
Seoul, Korea. 130871
Collected by Dr. H. N. Allen.
Seldom made use of by Koreans. This specimen is from China. Carried in the pocket.

THE PICTORIAL, PLASTIC, AND DECORATIVE ARTS.

METAL WORK.

CAST BRONZE IMAGE (ANCIENT) (In hiung). Rudely modeled. Represents a warrior in scale armor with sword in hand.

Height, 3⅛ inches.
Torai, southern Korea. 151606
Collected by P. L. Jouy.

EXPLANATION OF PLATE XXI.

KOREAN TOBACCO BOXES.

(Commencing at the left.)

Fig. 1. TOBACCO BOX. Oblong, rectangular box, of dark green serpentine with yellow mottlings; lid and box highly polished. Two compartments for holding different kinds of tobacco. Length, 6½ inches; width, 4⅝ inches; height, 4⅛ inches. (Cat. No. 130846, U. S. N. M. Seoul, Korea. Collected by Dr. H. N. Allen)

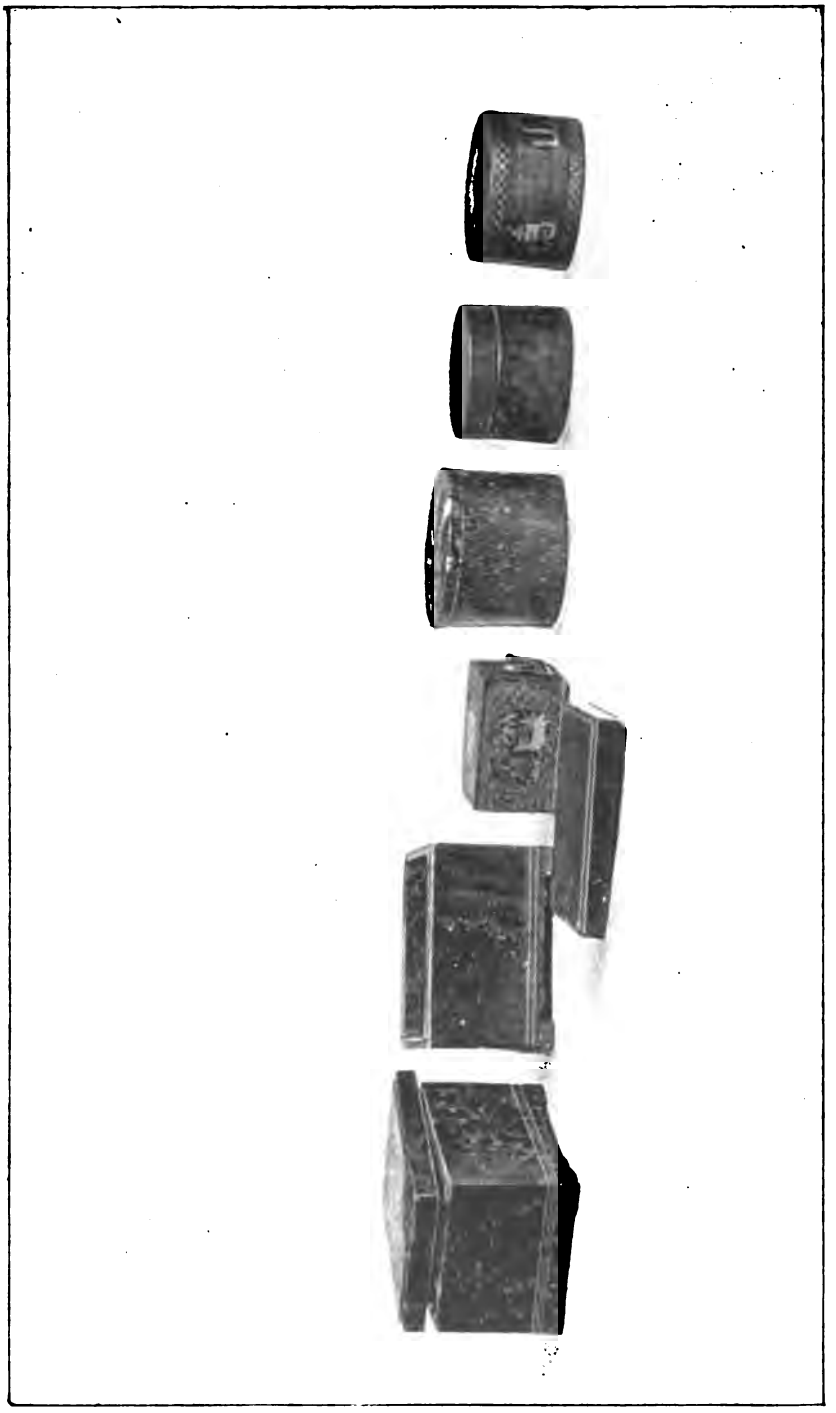
Fig. 2. TOBACCO BOX. Oblong, rectangular box, finely wrought from green serpentine, highly polished, with cover. Length, 6 inches; width, 4½ inches; height, 3½ inches. (Cat. No. 130845, U. S. N. M. Da Chun City, Korea. Collected by Dr. H. N. Allen.)

Fig. 3. TOBACCO BOX. Rectangular iron box inlaid with silver; sliding lid; bolt for fastening; brass staple, through which a strap is passed in carrying. Designs on the sides: the stork, tortoise and deer, emblems of longevity. On lid, the Sang-hi "Long-life and happiness" character. Size, 4 by 2⅝ by 2½ inches. (Cat. No. 77138, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 4. TOBACCO BOX. Circular box, with lid; made of a soft reddish soapstone called hua-ban-sŏk. Turned on a reciprocating lathe and polished with stone dust, a rough equisetaceous plant (sok-sa), and oil. Height, 3½ inches; diameter, 4⅛ inches. (Cat. No. 151617, U. S. N. M. Fusan, Korea. Collected by P. L. Jouy.)

Fig. 5. TOBACCO BOX. Circular iron box, with lid; inlaid with copper filatures. Designs: plum bloom, bamboo, pine, chrysanthemum, birds, and insects. The lid bears the "Good-luck" character. Height, 3 inches; diameter, 4 inches. (Cat. No. 77039, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 6. TOBACCO BOX. Circular iron box, with lid; inlaid with silver filatures and lacquered in the interspaces. Side ornamented with archaic Chinese characters; reserve spaces filled with a mat in fret design. "Happiness" character on lid. Height, 2½ inches; diameter, 4½ inches. (Cat. No. 151614, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN TOBACCO BOXES.

BRONZE IMAGE (ANCIENT) (In hiung). Figure of a warrior; arms missing, but from the position of the stumps he seems to be drawing a bow.

Height, 3¼ inches.
Torai, Korea, 1883. 151605
Collected by P. L. Jouy.
Probably used as an ornament on some building (temple) or on armor.

CAP OF FIRE BOX (Hwa-ru-dug-ke). Brass; circular; perforated design of lotus flowers, etc.; chased and repousséed.

Diameter, 9⅞ inches.
Korea. 151613
Collected by P. L. Jouy.
From a temple vessel, probably a hand-warmer.

KEY BELL (Bang-wool). Globular cast brass; raised ornamentation.

Diameter, 2 inches.
Fusan, Korea. 151604
Collected by P. L. Jouy.

GONG BELL (Pung-kiung). Brass; cruciform clapper with globular ends. A chain hangs down from the clapper bearing a sheet brass fish, which rings the bell when swayed in the wind.

Height, 2¼ inches.
Seoul, Korea. 151516
Collected by P. L. Jouy.
Hung in the eaves of houses and temples. The Japanese have a similar custom.

INLAYING, EMBROIDERY, ETC.

PILLOW END (Be-ga-mo). Disk of wood painted. Design, two tigers and pine tree. Coated with a transparent layer of gelatinous substance resembling horn. Pl. XXII, fig. 1 (commencing at the left).

Diameter, 6 inches.
Seoul, Korea, 1885. 77035
Collected by Ensign J. B. Bernadou, U. S. Navy.
The Korean pillow is a cylindrical case stuffed with hair or rice straw. It has ornamented ends.

PILLOW END (Be-ga-mo). Circular piece of wood, lacquered; incrusted with haliolis shell. Figures represent a tiger under a pine tree; along the border is a band of arabesque. Pl. XXII, fig. 2 (commencing at the left).

Diameter, 8¼ inches.
Tong-young City, Korea. 130851
Collected by Dr. H. N. Allen.
This is not part of a regular pillow, but for the kind used as an arm rest.

PILLOW END (Ja-ga-be-ga-mo). Disk of wood fastened in the end of the cylindrical pillowcase; inlaid in black lacquer with haliolis shell. Subject, the great dragon rising from the sea into the sky in the spring season. Pl. XXII. fig. 3 (commencing at the left).

Diameter, 8 inches.
Seoul, Korea, 1885. 77082.

PILLOW END—Continued.

Collected by Ensign J. B. Bernadou, U. S. Navy.

The riong, or dragon, is one of the four mythologic beasts. In pure art the whole body of the dragon is not shown, but partly shrouded in clouds.

PILLOW END (Ja-ga-be-ga-mo). Circular disk of wood, inlaid with mother-of-pearl. Design, the Chinese "good luck" character. Pl. XXII, fig. 4 (commencing at the left).

Diameter, 7 inches.

Seoul, Korea, 1885. 770

Collected by Ensign J. B. Bernadou, U. S. Navy.

PILLOW END (Be-ga-mo). Embroidered in colored silk. Design, the Chinese tai-ki, three comma-shaped objects coiled in a circle. Around this is grouped the eight geomantic signs. Pl. XXII, fig (commencing at the left).

Seoul, Korea. 770

Collected by Ensign J. B. Bernadou, U. S. Navy.

The colors are related to the meaning of the symbol.

EMBROIDERED SCREEN (Su-biung). Folding screen with ten leaves embroidered in flowers, butterflies, etc., on a white satin ground. Along the border of the oblong surfaces are strips of brocaded silk.

Seoul, Korea. 13085

Collected by Dr. H. N. Allen.

Generally found in ladies' apartments. This specimen was made in northwest Korea.

PAINTING IN WATER COLORS.

SCROLL PICTURE (Yong-gu-rim). In colors; represents the dragon rampant in the clouds, with its mysterious ball (yu-u-ju).

Length, 47 inches; width, 28 inches.

Interior of southern Korea. 15159

Collected by P. L. Jouy.

The ball before the dragon is believed to possess mystic qualities; by it the dragon causes wind to blow, rain to fall, and other miracles. Ignorant people to bring good fortune hang a picture of the dragon in their sleeping rooms. The figure of the dragon is popularly used in paintings and carvings, not only because of the old belief in the fabulous stories, but because the long body with four short legs is convenient to make many curves like arabesques and to fill a narrow space in decoration.

SCROLL PICTURE (Gu-rim.) "Spring in Korea;" in water colors. The favorite plum trees in bloom, willows with expanding leaves, etc., are well painted, and the whole effect is pleasing.

Length, 6 feet 7 inches; width, 3 feet.

Seoul, Korea. 15159

Collected by P. L. Jouy.

Painted by Jo Jung Muk, an artist in government service who is noted for his water-color portraits.

EXPLANATION OF PLATE XXII.

KOREAN INLAID AND EMBROIDERED PILLOW ENDS.

(Commencing at the left.)

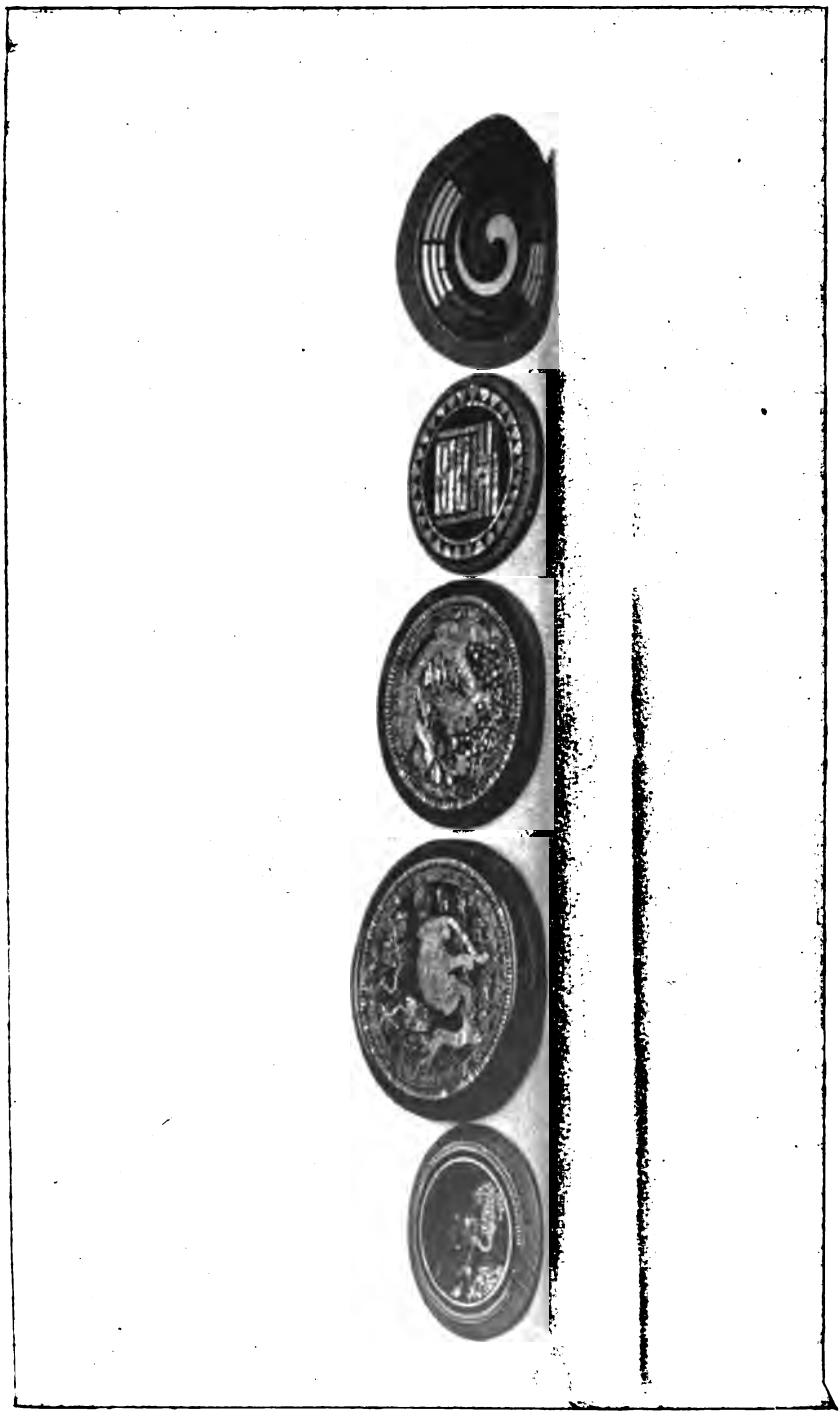
Fig. 1. PILLOW END. Disk of wood, painted. Design, two tigers and a pine Surface, coated with a transparent layer of a gelatinous substanc sembling horn. Diameter, 6¼ inches. (Cat. No. 77035, U. S. N. M. S Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 2. PILLOW END. Disk of wood, lacquered; incrusted with haliotis shell. sign, tiger under a pine tree; along the border is a band of arabesqu shell. Diameter, 8¼ inches. (Cat. No. 130851, U. S. N. M. Tong-y City, Korea. Collected by Dr. H. N. Allen.)

Fig. 3. PILLOW END. Disk of wood incrusted in black lacquer with irides haliotis shell. Subject, the great dragon rising from the sea into the in the spring season. Diameter, 8 inches. (Cat. No. 77032, U. S. N Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 4. PILLOW END. Disk of wood, inlaid with mother-of-pearl. Design, Chinese "Good Luck" character. Diameter, 7 inches. (Cat. No. 77 U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S.

Fig. 5. PILLOW END. Embroidered in colored silks. Design, the Chinese ta three comma-shaped objects coiled in a circle. Around this are grou the eight geomantic signs (Pal-qua). Diameter, 8 inches. (Cat. 77034, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernad U. S. N.)



KOREAN INLAID AND EMBROIDERED PILLOW ENDS.

OOK OF WATER-COLOR PAINTINGS (Hwa-chup). Painted in water color on silk. The eight sketches of birds and animals are painted by one artist and alternated with three kinds of hieroglyphics written by different men. The work is excellent and full of feeling.

Length, 18 inches; width, 11¼ inches.
Collected by P. L. Jouy.
Painted about 1790, by Huin-ja or "Ye Chok," one of the popular artists of that time, who lived at Sing Chow. Drawn in Seoul while on a visit to the Kim family.

ROLL PICTURE. Water color of a tiger (Jok-ja, under a pine-tree. Iron rings for suspension.

Length, 47½ inches; width, 28 inches.
Seoul, Korea. 151597
Collected by P. L. Jouy.

RCELAIN SCREEN. Photograph of a fine painted screen from the royal palace.

Seoul, Korea. 129558
Collected by Gustavus Goward.

ATER-COLOR PAINTING (Gu-rim). Man in ordinary dress and hat worn at home. 1.

ATER-COLOR PAINTING (Gu-rim). Closed sedan with sliding windows, carried by four men. Used by the high officers and their wives. Compare the Japanese Kago. 2.

ATER-COLOR PAINTING (Gu rim). Officer in armor with sword in hand. 3.

The armor worn by officers is made of small plates of leather and iron joined together. It is covered with red woolen cloth ornamented with figures made of copper or silver gilt and bordered with fur and lined with thick blue silk. Officers are allowed to use the royal color.

ATER-COLOR PAINTING (Gu-rim). Officer in full dress uniform. 4.

ATER COLOR PAINTING (Gu-rim). Man riding, servant leading the horse. 5.

ATER-COLOR PAINTING (Gu-rim). Prime minister seated on a sedan carried by four men. The sedan and large fan are lawfully allowed only to the prime minister. 6.

ATER-COLOR PAINTING (Gu-rim). Buddhist priest with hat of straw in the act of bowing. 7.

ATER-COLOR PAINTING (Gu-rim). Officer's servant dressed in black coat and hat and white belt, carrying his master's official dress and tobacco box. 8.

ATER-COLOR PAINTING (Gu-rim). Palace servant wearing brown coat and blue sash; sword on back. 9.

This servant is selected from the class of respectable citizens and trained as a regular soldier. There are five hundred such servants in the palace at Seoul.

ATER-COLOR PAINTING (Gu-rim). Lady in ordinary dress. The small ornament on the top of the head and the purple vest are never worn together. 10.

WATER-COLOR PAINTING (Gu-rim). Boy in house dress: the queue shows that he is unmarried. 11.

WATER-COLOR PAINTING (Gu-rim). Lady in house dress consisting of a yellow coat and red skirt; these colors are only worn by unmarried women. 12.

The hair ornament is always adorned with jewels except in mourning. It is prohibited to widows.

WATER-COLOR PAINTING (Gu-rim). Lady in street costume, wearing the prescribed green veil. 13.

WATER-COLOR PAINTING (Gu-rim). Lady in house dress. 14.

WATER-COLOR PAINTING (Gu-rim). Prime minister in pink robe seated on a sedan. The fan and sedan show the rank. Pink is used by all officers of the upper house, either civil or military. 15

WATER-COLOR PAINTING (Gu-rim). Servant of the tribunal of chamber court. 16.

WATER-COLOR PAINTING (Gu-rim). Civil officer of the second rank denoted by golden belt; seated on a sedan of lacquered wood having one wheel. The seat is about 5 feet from the ground and the sedan is propelled and supported by 5 men. 17.

Size, 14 by 11¼ inches.

The monocycle usually travels faster than the Korean horse. Officers in this high sedan usually have twenty followers.

Collected by W. W. Rockhill.

The preceding series (Nos. 1–17) is from Seoul, Korea. 131315 (17

BOOK OF WATER-COLOR PAINTINGS (Hwa-chup). Bound in folio of the native paper, with back of blue cloth. Contains thirty-seven stiffly drawn figures of sages and spiritual beings, illustrating the mythological stories of Korea.

Seoul, Korea. 13088

Collected by Dr. H. N. Allen.

SCROLL PICTURE OF A KOREAN LADY. Painted in water color. This picture gives an idea of the mode of wearing the hair and the house costume of the Korean ladies.

Size, 24 by 48 inches.

Seoul, Korea, 1885. 7707

Collected by Ensign J. B. Bernadou, U. S. Navy.

The pictures used in the decoration of the inner or living rooms of the common people are gaudily colored and stiffly drawn. The subjects of Korean common pictorial art are flowers, fruits, animals, etc., in contrast with the dramatic and blood-curdling common prints of the Japanese.

PICTURE. Colored. Storks, deer eating "immortal grass," and turtle in the sea. Poetical illustration. 1.

Used for household decoration by the lower-class Koreans. This picture illustrates the "Ten long lives," or those things in nature existing longer than human beings. They are the sun, moon, mountain, water, turtle, deer, swan, pine, bamboo, and a plant called hu-sut.

PICTURE. Flowers, colored. The rose, chrysanthemum, *hibiscus mutabilis*, peony, convolvulus, grapes; an aquarium with fish, two vases decorated with geomantic (national) symbols, placed on table and floor, are shown. 2.

Usually seen in living rooms of the common people.

PICTURE. Colored. Subject, the male and female phœnix with young near their nest in the black rock under the odong or paulownia tree. Sunrise. 3.

In Korean folklore these birds, called "Pong and Hoang," are said to bring forth their young like animals and only on the birth of a sage is a phœnix born. The nest must be in a hole in the rock under the shade of a paulownia tree.

PICTURE. Golden pheasants, mowtan peony, plum tree, waterfall, and pair of little birds. 4.

House decorations of the common people.

PICTURE. Vase decorated with wave pattern; filled with flowers of the hibiscus, hul-su or snapdragon, pomegranates, and apricots. On the ground, oranges and bunches of immortal grass. 5.

Picture such as is found in living rooms of the common people. Hung upon the door.

PICTURE. Represents a cock. One of the four watchful animals. 6.

One of the four pictures such as are found hanging on the outside of the storeroom in the dwellings of the common people.

PICTURE. Decorated vases, pencil rest, dish of peaches on table, coral and peacock feathers in tall vase decorated with wave pattern, mystic bowknot, and conventional dragon. 7.

The common people delight in these gaudy pictures and hang them up in their living rooms. Used for hanging on a closet door.

PICTURE. Tiger and immortal plant. 8.

Gaudy picture bought by the common people.

PICTURE. Dog, with collar and bells around its neck. 9.

One of a set of four pictures which decorate the outside of a storeroom.

PICTURE. Vases and dishes, roll of pictures tied together with band of ribbon. Dish contains kam or persimmons, a Korean fruit. 10.

Used by common people. Hung on the closet door.

PICTURE. Mythological beast called a lion, with collar and bells. Tongues of flame issue from its feet. 11.

One of the four animals of watchfulness. Hung outside of a storeroom.

PICTURE. Tiger rampant. A favorite representation of Korean artists. 12.

One of the four pictures of the watchful animals hung on the outside of the storeroom.

Collected by Ensign J. B. Bernadou, U. S. Navy.

The preceding series (Nos. 1–12) is from Seoul, Korea, 1885. 77052 (12)

SCREEN. Silk; painted with a scene which represents an emperor of China of the Ming dynasty receiving presents from states tributary to China. Eight leaves; old, rare, and finely painted.

Width, 22 inches; length, 4 feet.

Seoul, Korea, 1885. 77116

SCREEN—Continued.

Collected by Ensign J. B. Bernadou, U. S. Navy.

This screen is worthy of close study for the number of nationalities depicted and from the fact that it is an example of the finest Oriental hand-painting. The scene is of about four hundred years ago; the Koreans with pardonable pride have placed themselves in the front rank.

WATER-COLOR PAINTING. Mandarin duck. 1.

WATER-COLOR PAINTING. White cock, hen, and chicks by the bamboo brake. 2.

WATER-COLOR PAINTING. Hawk on cliff overhanging the sea, with captured duck. 3.

This picture is well drawn; the spray under the seaweed-covered rock and the fierce mien and pose of the hawk are well executed.

WATER-COLOR PAINTING. Hawk about to attack a monkey, which hides itself under the trunk of a pine tree. 4.

The monkey is not found in Korea.

WATER-COLOR PAINTING. Eagle perched in a plum tree. 5.

WATER-COLOR PAINTING. White eagle with quarry; a pheasant. 6.

WATER-COLOR PAINTING. Swans among the reeds. Poetical. 7.

WATER-COLOR PAINTING. Korean hunting falcon in pursuit of a white hare. 8.

WATER-COLOR PAINTING. Flock of cranes on a pine tree. Poetical and mythological illustration. 9.

WATER-COLOR PAINTING. Crane and fragrant plum tree. Poetical and metaphorical, the crane signifying the child and the plum tree the mother. 10.

WATER-COLOR PAINTING. Lion under pine tree. Very poor representation. 11.

WATER-COLOR PAINTING. Tiger crouching under a pine tree. 12.

WATER-COLOR PAINTING. Gray squirrel on branch of pine tree. 13.

WATER-COLOR PAINTING. Pair of musk deer. Probably an illustration of some poem. 14.

WATER-COLOR PAINTING. Pair of antelope. 15.

WATER-COLOR PAINTING. Well-groomed horse tied to a willow tree. Spring scene; often painted by Korean artists. 16.

WATER-COLOR PAINTING. Horses at play, leaping and rolling. Spring scene; an illustration of a poem. 17.

WATER-COLOR PAINTING. Pair of dogs under trees. Mythological dogs, illustrating a folk story. 18.

WATER-COLOR PAINTING. Sea monster (whale) swallowing a junk. 19.

WATER-COLOR PAINTING. Manchurian crane. 20.

SEPIA DRAWING. Landscape, winter scene; mountains partly covered with snow. Shows a pagoda and the roof of a temple. 22.

WATER-COLOR PAINTING. Landscape, summer scene; shown by thick foliage and by people sitting in the open pavilions. 23.

WATER-COLOR PAINTING. Landscape, spring scene; village at sunset, men reading by the window, and fishers returning across a quaint bridge. 24.

WATER-COLOR PAINTING. Landscape, autumn; maple trees, water flowing under a stone bridge, a man on a two-wheeled sedan of the kind probably used in Korea in old times. 25.

WATER-COLOR PAINTING. Illustrates the story of a man who was famous for his good handwriting. No one has attained to his excellence since his death. 26.

Collected by Ensign J. B. Bernadou, U. S. Navy.

The preceding series (Nos. 1–26) is from Seoul, Korea. 77117

WATER-COLOR PAINTING. Landscape, autumn moonlight scene; the maples and bamboo surround the student's house. 1.

WATER-COLOR PAINTING. Landscape, winter moonlight scene after a snowstorm. 2.

WATER-COLOR PAINTING. Butterflies and flowers. 3.

Painted by Han, a native artist. Used for house decoration.

WATER-COLOR PAINTING. Submarine view, crabs, shrimps, mollusks, and seaweeds. 4.

This picture bears marks of having been drawn by a literary man rather than a regular artist.

WATER-COLOR PAINTING. Story of Lomoo, a Chinese officer banished by the Emperor through intrigue. Though he had grown old in exile, and suffered from hunger and privation, yet he loyally holds up the rod with five bunches of red silk given him by the Emperor. 5.

Collected by Ensign J. B. Bernadou, U. S. Navy.

The preceding series (Nos. 1–5) is from Seoul, Korea, 1885. 77118

By far the better pictures in the collection are the following outline sketches in India ink, which may be entitled "Scenes from the Social life of Korea." They are a revelation in Korean art, since they show bold drawing, free treatment, and humorous caricature like that found in the realistic school of Japan.

These pictures illustrate the social customs and industrial arts of the people. They were originally bound together to form a boy's picture book. They are supposed to be nearly three hundred years old.

INDIA-INK DRAWING. Mythological picture; the seven good beings or secondary angels of Korea and China, with the animals and plants appertaining to them. These beings in Japan are called the seven gods of happiness. The central figure bears a striking resemblance to the Japanese Hotei, the president of the seven. The

INDIA-INK DRAWING—Continued.

scene is interesting in tracing the Chinese influence to Japan through Korea. This set of character pictures were drawn by the artist Han-jin-o. 1.

INDIA-INK DRAWING. Mythological picture; the seven wise men or gods of good fortune. The central figure, Laotze, writes verses upon a scroll and produces jewels and living animals from his pen. 2.

INDIA-INK DRAWING. Marriage procession of the groom visiting his intended bride. Men in advance carry lanterns for the occasion, followed by the bearer of a wild duck or model of one, the symbol of domestic felicity. Then comes the bridegroom in court dress, always worn on such occasions by all except coolies. As a rule the young man's former nurse follows. 3.

INDIA-INK DRAWING. Coolies at a well. Around the wide, shallow well women are drawing water with rope and bucket, to fill jars which are carried on the head. 4.

This picture shows the dress of the lower class.

INDIA-INK DRAWING. Instruction in archery; teacher showing lad how to draw the bow. The awkward pose of the beginner is well caught. Others are stringing the bow and straightening the arrow. 5.

INDIA-INK DRAWING. Peddlers returning from work. Shows horses, pack saddles, coolie's dress, and method of smoking. 6.

The pack saddles shown here have a deep seat between two yokes. They are girthed and have a wide breech band. Rungs are set in between the yokes of the saddle, to which packages are tied. One of the coolies is striking a light with flint and steel.

INDIA-INK DRAWING. Begging bonzes on the road side. On a large sheet of paper are a number of strips upon which are written sums of money or grain as paid for certain efficacious prayers. The woman in front is about to throw down a few cash, for which the prayers will be said. The bonzes carry small boat-shaped drums, and sing the sacred songs invoking blessings on the contributors. The lady's attendant carries a smoking outfit on her head and fan in her hand. 7.

These priests are not regular beggars, but perform this office according to the rules of a certain sect.

INDIA-INK DRAWING. Preparing tobacco for smoking. The stems are removed and the leaves piled evenly, then the piles are cut into shreds with a long lever knife. The expectant attitude of the man who is waiting for some tobacco is very comical. 8.

INDIA-INK DRAWING. Peasant's family; woman spinning and man making matting on a weighted loom. The loom frame is two forked sticks driven in the ground and a bar placed across. The warp threads are wound around weights. These are divided alternately to opposite sides of the bar. In working the loom a weft straw is laid in where these threads cross the bar, and one set of

INDIA-INK DRAWING—Continued.

weights thrown over, the other set thrown back, inclosing the rush in the warp. This is a tedious process, but produces good work with little machinery and skill. Korean matting is very good. 9.

INDIA-INK DRAWING. Country people passing on the road. Shows the high saddle and common method of riding by holding on to the saddle and allowing the horse to be led. 10.

Etiquette requires that women vail their faces on meeting men. This represents the wedding procession returning from the bride's house.

INDIA-INK DRAWING. House building. Shows men planing timbers, tiling, etc. 11.

Tiles are imbedded in balls of mud placed upon the roof. The plane has handles at the sides.

NDIA-INK DRAWING. Wrestling match. Spectators; street candy seller. 12.

NDIA-INK DRAWING. Boats propelled by sculling, ferrying passengers across stream. 13.

NDIA-INK DRAWING. Women washing clothes by beating them with clubs on rocks. Women braiding hair; man peeping from behind his fan. 14.

INDIA-INK DRAWING. Coolies eating by the roadside. Bowls and spoons are being used. 15.

INDIA-INK DRAWING. Roadside inn. People of middle class taking food and smoking. 16.

These open roadside inns resemble those of Japan.

INDIA-INK DRAWING. Coolies resting by roadside; smoking and chatting. 17.

INDIA-INK DRAWING. Country peddlers. Man carries large basket of of vegetables or salt fish on his head; woman carries child and cradle-shaped basket containing crabs. 18.

The child is carried as in Japan, seated inside the loose upper garment.

INDIA-INK DRAWING. Forging. Smith holds red-hot iron on anvil, with tongs, while two men strike. Boy blows bellows, and man sits on the ground dressing piece of wood with curved drawknife. 19.

NDIA-INK DRAWING. Shoeing a horse. Tools lying on ground. 20.

The animal is thrown and the smith tacks on a circular shoe without calks. Korean horses are rarely castrated; hence are vicious. The officials ride donkeys almost universally.

NDIA-INK DRAWING. Plowing and working the fields. Two oxen are attached to a light, one-handled plow. Two men hoeing with implements resembling potato forks. 21.

In Korea the horse is never employed in the plow.

NDIA-INK DRAWING. Thrashing by beating sheaves across a rough log of wood and sweeping grain from the smooth, hard ground. The man taking his ease near by is the overseer. 22.

INDIA-INK DRAWING. Schoolmaster and class of children. Boys are studying, and one is "backing his book," that is, reciting by turning his back to the teacher and placing his book behind him. 23.

INDIA-INK DRAWING. Farmers' wives weaving. Woman working at a rude loom; an old woman taking care of children, and a woman singeing thread to remove frayed fibers before using it for weaving. 24.

INDIA-INK DRAWING. Hired-boy dancer and band of music. Musicians seated in semicircle. Instruments: Bass drum in frame like Japanese drum, accordeon, flute, fifes, and guitar. 25.

INDIA-INK DRAWING. Catching fish in a weir. Men in boats are dipping out fish into jars; at one end of weir is flock of birds. 26.

INDIA-INK DRAWING. Wood-carriers resting and playing a game with small stones; frames for carrying wood at one side. 27.

The carrying frame shown is rectangular, woven at back with rattan, with arm loops at side and ropes for encircling the burden. The arms are passed through loops and load carried on back. A much more commonly used frame is made of two forked limbs, cut about 3 feet long and mortised together with slats.

INDIA-INK DRAWING. Competitors for the civil-service examination. This style of dress, cap, and shoes are worn during the examination. One youth shows his friends the paper on which the answers will be written. 28.

Collected by Ensign J. B. Bernadou, U. S. Navy.

The preceding series (Nos. 1–28) is from Seoul, Korea, 1885. 77119 (28)

SOCIAL RELATIONS AND PUBLIC WELFARE.

COMMUNICATION AND RECORD OF IDEAS.

WRITING IMPLEMENTS AND METHODS—PRINTING.

SEAL (Do-su). Oblong hard-wood block, with seal characters cut on two faces. Obverse characters, "Gaw-wee," and reverse, "Seal of Cang-Won-sung-duk." Used by some private institution.

Dimensions, 4 by 2¼ by 1⅝ inches.
Seoul, Korea. 151607
Collected by P. L. Jouy.

BOX FOR SEALS AND INK (Do-su-hab). Oblong box of soapstone, of reddish color, with lid; highly polished.

Length, 4¼ inches; width, 3½ inches; height, 2 inches.
Seoul, Korea. 130844
Collected by Dr. H. N. Allen.
This beautiful soapstone is found in the southern part of the country.

UNCUT SEALS (9) (Do-su-dol). Oblong squared blocks of mottled soapstone. Used by literary men or artists.

Height, 1⅝ inches.
Seoul, Korea. 130843
Collected by Dr. H. N. Allen.

INCUT SEALS (Do-su-dol). Block of soapstone, with sitting figure of the lion badly carved. The square surface on the bottom is ready for engraving either a man's name or some motto.

Height, 2¼ inches.
Seoul, Korea. 130842
Collected by Dr. H. N. Allen.
This style of seal is generally used by literary people. The design originated in China.

INK STONE (Be-ru-dol). Oblong slab of black slate, with cover of wood.

Length, 4⅛ inches; width, 2¼ inches.
Nam-po City, Korea. 130838
Collected by Dr. H. N. Allen.

INK STONE (Be-ru-dol). Oblong slab of hard black stone, with lid, on which is carved a flowering plum tree.

Length, 5½ inches; width, 3 inches.
Nam-po City, Korea. 130839
Collected by Dr. H. N. Allen.

ROLLS OF LETTER PAPER (Du-ru-ma-ri). White paper sized and polished. Medium quality; made from the bark of the tak tree.

Width, 6½ inches.
Seoul, Korea. 130837
Collected by Dr. H. N. Allen.

PENCILS OR BRUSHES (Boot). Made from the hair of a small animal resembling the rat (chung-sal-mo), fixed in bamboo.

Length, 8 inches.
Seoul, Korea. 130841
Collected by Dr. H. N. Allen.
For letter-writing and copying. Generally manufactured in the province of Ham-kiung-do.

PENCIL JAR (Pil-tong). Porcelain cylinder decorated with figures of a man and a woman, in water colors.

Height, 4½ inches; diameter, 2⅝ inches.
Seoul, Korea. 130840
Collected by Dr. H. N. Allen.

PENCIL JAR (Pil-tong). Octagonal vase of precious serpentine.

Height, 5⅝ inches; diameter, 4¼ inches.
Seoul, Korea, 1885. 38329
Collected by Ensign J. B. Bernadou, U. S. Navy.
This stone is prized by the Koreans, who make from it pencil jars, ink stones tobacco boxes, etc.

PENCIL REST (Pil-san). Carved soapstone, representing Lo ja (Laotze), a Chinese philosopher, seated on a cow.

Height, 2¼ inches.
Seoul, Korea. 130867
Collected by Dr. H. N. Allen.

BRUSH HOLDER (Pil-tong). Carved teak wood, representing a knotty tree trunk.

Height, 10 inches; diameter, 10½ inches.
Seoul, Korea. 130879
Collected by Dr. H. N. Allen.
Of the form used by Chinese scholars for holding brushes and rolls of paper.

WOOD BLOCK (cast). Double face, the upper showing the face and back of the harp called Ka-mun-go, a Chinese instrument. The lower face, with picture of flight of butterflies.

Length, 11 inches; width, 5 inches.
Seoul, Korea. 153614
Collected by P. L. Jouy.
Used to "pull" imprints on letter paper by rubbing.

PRINTING BLOCK (Ban-jul-pan). Wooden block; ends wedge-shaped for fitting into a holder. Engraved. Pl. XXIII.

Length, 17¾ inches; width, 8 inches.
Seoul, Korea, 1885. 77018
Collected by Ensign J. B. Bernadou, U. S. Navy.
Blocks and movable type are both used in Korea. This is a common block for printing the alphabet sheet from which children learn the ön-moun or native Korean character. The characters are arranged in vertical columns, and above each is a rough pictorial representation of something containing the initial consonant sound of the characters in the column. The writing on the left is astrological.
Satow says, "There are some Korean books dating back to 1317 and 1324, printed with movable type."*

PROPERTY, TRADE, COMMERCE, AND INTERCOMMUNICATION.

CARRYING CLOTH. Square piece of coarse cotton stuff stamped in black. At each corner is sewn a strong band of folded cotton.

Size, 48 by 55 inches square.
Seoul, Korea. 153613
Collected by Ensign J. B. Bernadou, U. S. Navy.
Wrapped around parcels carried by porters.

METHODS AND MEDIA OF EXCHANGE.

THREE "CASH" PIECE. Copper coin worth about 3 cents. Inscription, "Great East. Three cash."

Diameter, 1 inch.
Korea. —
Gift of W. A. Mintzer, U. S. Navy.

SILVER COIN (Sam jun). The inscription is "Great Eastern Kingdom, one mace." In center of obverse of coin is a disk of transparent blue enamel about $\frac{1}{6}$ of an inch in diameter. Beneath this is the character for treasury. Debased silver, value about 15 cents.

Diameter, ¾ of an inch.
Korea. —
Gift of W. A. Mintzer, U. S. Navy.
These curious coins are rare, having been withdrawn from circulation.

* Trans. Asiat. Soc. of Japan, x, No. 1, p. 63.

EXPLANATION OF PLATE XXIII.

KOREAN PRINTING BLOCK.

PRINTING BLOCK. Of wood; end wedge-shaped for fitting into a holder. Characters both sunken and engraved in relief. Block used for printing the alphabet sheet for children. Length, 17¼ inches; width, 8 inches. (Cat. No. 77018, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

KOREAN PRINTING BLOCK.

R COIN (Sam jun). Inscription, "Great Eastern Kingdom, two ace." Disk of enamel in center of obverse. Debased silver, value out 30 cents.

Diameter, 1 inch.
Korea. —
Gift of W. A. Mintzer, U. S. Navy.
These coins are rare, having been withdrawn from circulation.

AN "CASH" (Dang-o-jun). Coins made of an alloy of copper, tin, id lead. Square hole in center as in Chinese coins. Reverse bears ur characters giving name of coin, and the obverse the place where was made, the number of the furnace, and the value, about $\frac{1}{8}$ of a nt.

Diameter, $1\frac{1}{4}$ inches.
Seoul, Korea. 130863
Collected by Dr. H. N. Allen.
This coin is unpopular, as it is badly made. This kind of money was first introduced from China in 1884, and adopted by the Conservative party.

SWORD (Soe chun). Chinese cash, tied in shape of sword with ored strings and decorated with silk fringe.

ength, 20 inches.
orea. 130908
ollected by Dr. H. N. Allen.
nerally made by ladies and kept as curiosities.

(Buil don). Alloy of copper, lead, and brass. Cast. A wide d of perforated designs of the long-life symbols, alike on either e of the medal, surrounds a central circle containing on one side Chinese characters signifying "His Majesty; (may he live) ten usand years" and on the other "Wealth, official promotion, many ldren." On either side are four national symbols. Square hole enter. Pierced for suspension.

ameter, $2\frac{1}{16}$ inches.
oul, Korea, 1889. 130876
ollected by Dr. H. N. Allen.
uck in the precincts of the palace at the times of the establishment of the , which is not a permanent fixture of the Government.

RECREATION AND AMUSEMENT.

GAMES OF SKILL AND CHANCE. AMUSEMENTS.

NG CARDS (T'ou-tjyen). Eighty-one long, narrow strips of oiled per, with suit signs in black. Eight suits: The man, fish, hawk, easant, deer, steer, rabbit, and horse, the numerals running up nine and a general. Pl. XXIV, Fig. 1, left side.

ength, 8 inches; width, one-quarter of an inch.
eoul, Korea, 1885. 77047
ollected by Ensign J. B. Bernadou, U. S. Navy.
everal varieties of cards, differing as to the number of suits, are played in rea. These cards resemble the lots used by Chinese gamblers to determine k.

CHINESE CHESSMEN (Tjang-keui). Thirty-two hexagonal blocks of pine wood, of three different sizes. Characters, Chinese, cut in the blocks and painted blue or red. Pl. XXIII, Fig. 2, lower right-hand corner.

Seoul, Korea, 1885. 77025

Collected by Ensign J. B. Bernadou, U. S. Navy.

The name means "game of war." It is curious that the rank depends on the size of the pieces, as in case of Japanese chin. Whether more ancient in type than the pieces at present used in China, which are of uniform size, is conjectural. Played on a board made of wood or paper.

DOMINOES (Kolpai. "Bone game"). Thirty-two ivory dies marked with red and black spots large and small. Pl. XXIV, Fig. 3. upper right-hand corner.

Size of dies, ¼ inch long; one-half inch wide.

Seoul, Korea, 1885. 77024

Collected by Ensign J. B. Bernadou, U. S. Navy.

The arrangement of the spots on these is identical with the dominoes of China and it is probable that the games are the same. In this game five or six can play. They in turn cast off and draw until one player gets a suit of doubles from one to six, when he cries "Suit," having won. Each player draws five bones at first.

INITIATION CLUB AND NOOSE (Yong-bag-mang-i and Jul). Wood; head carved to represent the dragon; painted in colors. Cord of plaited silk attached to handle. The jul is a rope made of strands of pink cotton overplaited by pink, blue, and yellow silk thread. It has a running noose at one end.

Length, 21 inches.

Seoul, Korea. 151631-2

Collected by P. L. Jouy.

Kept in the office of the messengers in the palace, official mansions, and governmental departments. Newcomers are initiated by the "society," who pass the noose around the ankle of the candidate and draw up his foot across the knee. Then a set of difficult questions are asked, and for every wrong answer the victim receives a blow upon the sole. This initiation is with a view of getting a treat. Newly married men are also put through a similar ordeal by their friends.

MUSIC AND MUSICAL INSTRUMENTS.

Music is an important institution in Korea. The government educates and maintains musicians and allows bands to furnish music for official receptions and at the palace.

There is a system of notation; the notes are circles and their tonal value is indicated by the shaded area.

Vocal classes are taught the range through which the voice should rise and fall by the inclination of a rod in the hands of the teacher. This is similar in effect to the Thibetan descriptive score. *

There are many musical instruments of all classes. The double-headed drum produces four distinct sounds, according to the place

* W. W. Rockhill: The Land of the Lamas, p. 88.

EXPLANATION OF PLATE XXIV.

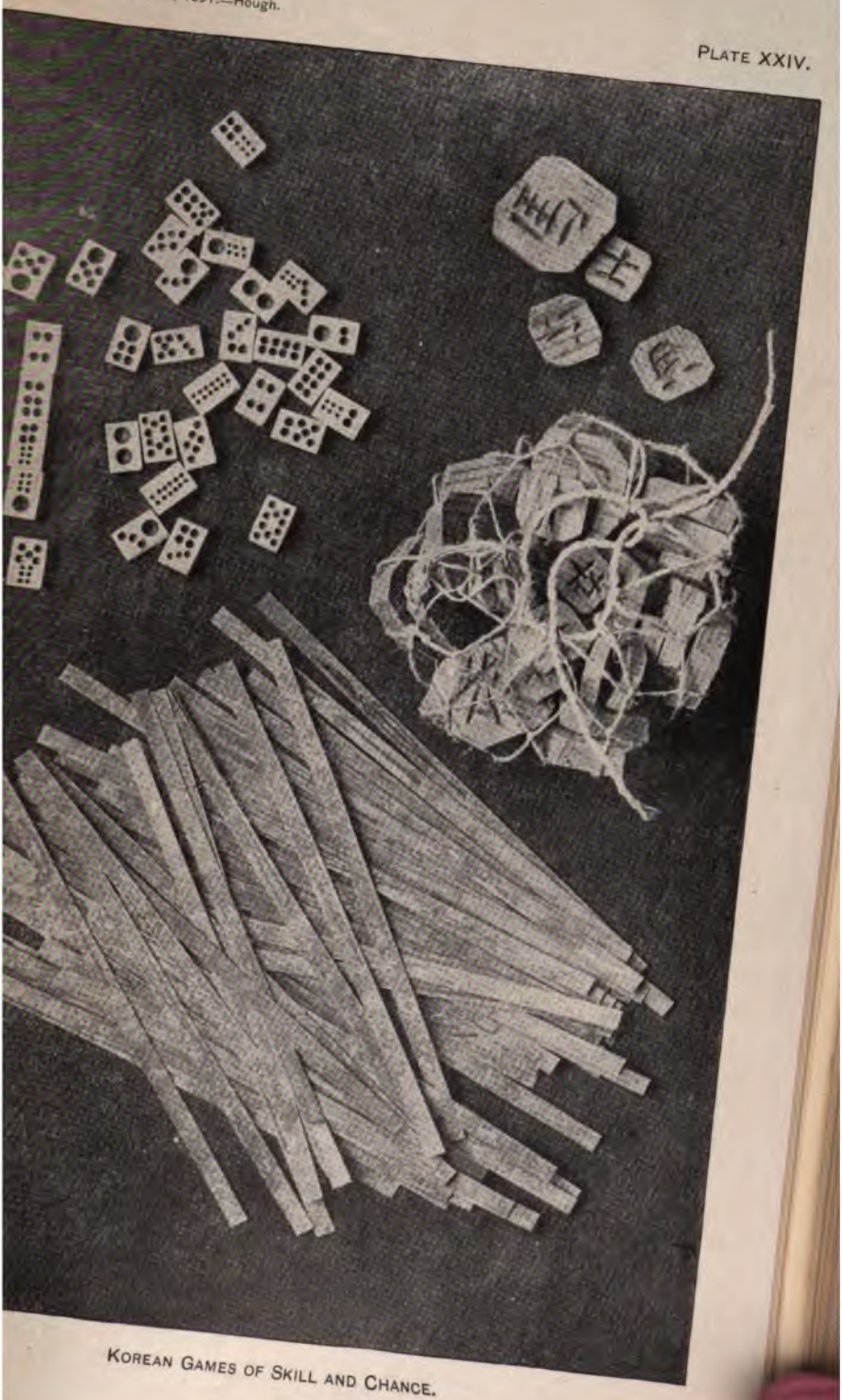
KOREAN GAMES OF SKILL AND CHANCE.

Fig. 1. PLAYING CARDS. Eighty-one long, narrow strips of oiled paper with the suit signs written on them. There are eight suits—the man, fish, hawk, pheasant, deer, steer, rabbit, and horse. Length, 8 inches; width, ¼ inch. (Cat. No. 77047, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

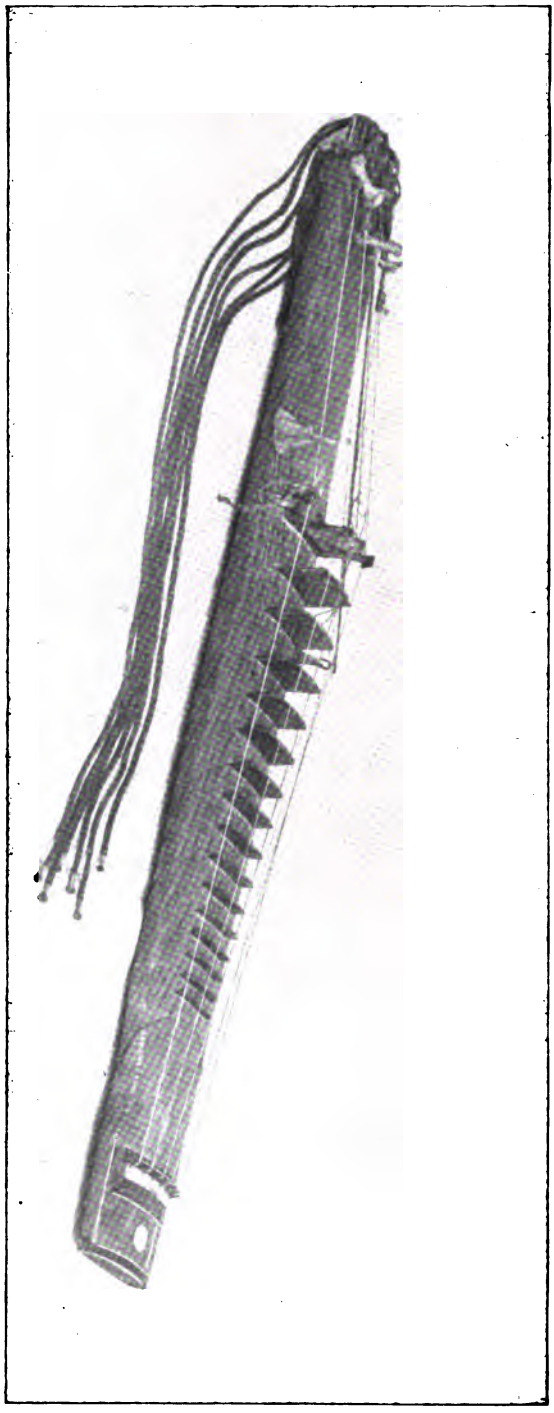
Fig. 2. CHINESE CHESSMEN. Thirty-two hexagonal blocks of pine wood, of three different sizes. Characters, Chinese; cut in the blocks and painted red and blue. (Cat. No. 77025, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

Fig. 3. DOMINOES. Thirty-two ivory dies, marked with red and black spots, large and small. Size of die, ¾ inch long, ½ inch wide. (Cat. No. 77024, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

PLATE XXIV.



KOREAN GAMES OF SKILL AND CHANCE.

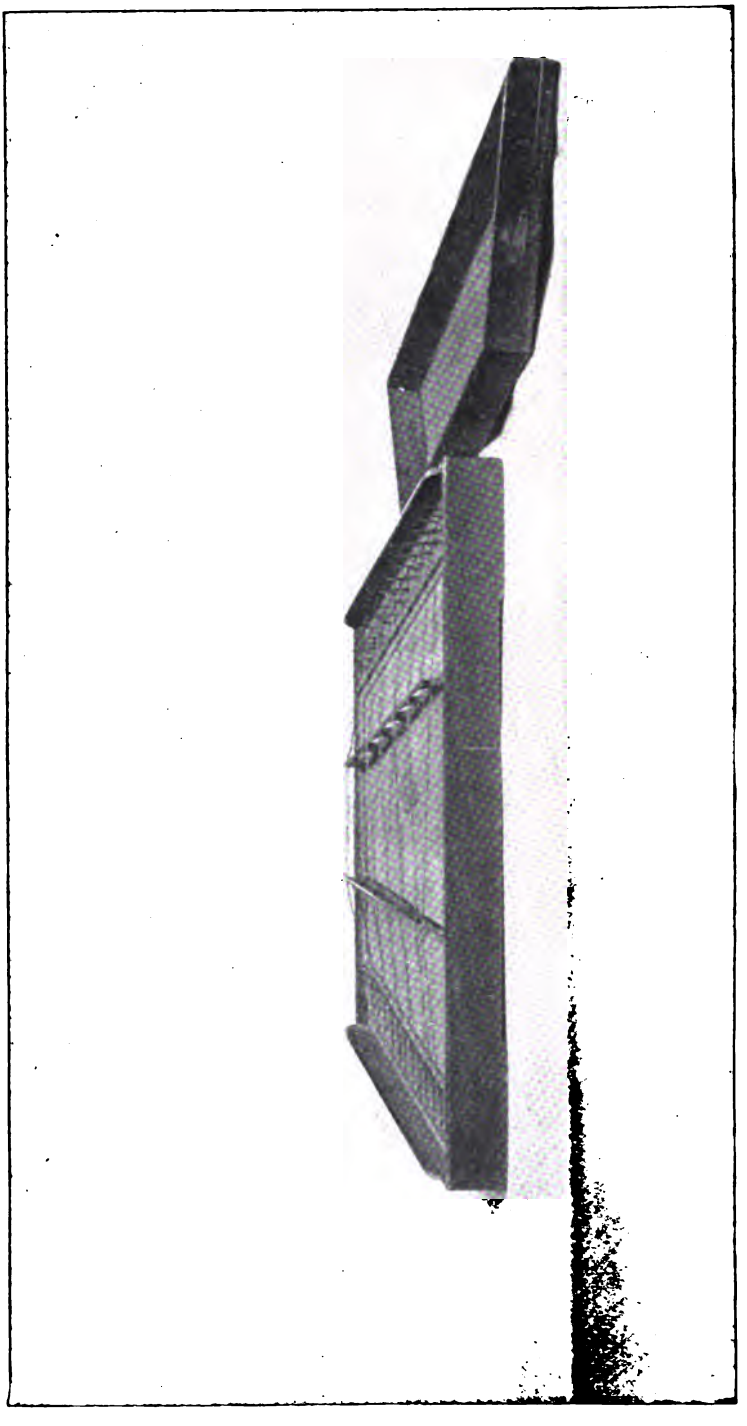


KOREAN HARP.

EXPLANATION OF PLATE XXV.

KOREAN MUSICAL INSTRUMENT.

HARP. Body long and narrow with half oval section, made of jatropha curcas wood, the "kiri" of Japan. Six strings, tightened by buttons; fourteen frets. On the bottom is engraved a verse by a Chinese scholar; ornamentation of bats and fretwork characters appear on other portions. This instrument resembles the Japanese Koto, and is played, like the latter, with the plectron. Length, 22¼ inches. (Cat. No. 93569, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)



KOREAN DULCIMER.

EXPLANATION OF PLATE XXVI.

KOREAN MUSICAL INSTRUMENT.

DULCIMER. Flat, hollow box of o-dong wood, trapezoidal in shape; with lid. Twelve groups of four thin brass wires each are stretched across the box, over and beneath two diagonal bridges. Iron pegs and tuning keys. Played by striking keys with a thin strip of bamboo, the instrument being held by placing the forefinger in a hole beneath the box, and resting the latter on the tips of the fingers and thumb. Length, 22 inches; width, 6¼ inches; height, 3⅜ inches. (Cat. No. 130889, U. S. N. M. Seoul, Korea. Collected by Dr. H. N. Allen.)

KOREAN GUIDEPOST.

EXPLANATION OF PLATE XXVII.

KOREAN GUIDEPOST.

GUIDEPOST. Rude log of wood with grotesquely carved human face. When complete it is crowned with a hat, has large ears, and thin strips along either side to represent clothing. These posts are placed along the road at intervals of half a mile. Complete specimens are about 6 feet high, are painted, and bear on the front an inscription showing the distances. It is believed that the signpost is also a shamanistic idol to the spirits of the place.

(From a sketch from nature by P. L. Jouy.)

stick; by combination these sounds may be increased to seven. The drum has a hollow wooden body of hour-glass shape; the heads are drawn over the ends of the body and extended over two iron rings. The lacing of rope with tighteners runs between these rings. The larger head is of skin and the smaller of membrane. The deepest sound is made by striking the skin head in the center, the rim gives another sound, the membrane head gives a lighter, noisier sound.

HARP (Kom-oun-to). Body long and narrow with half oval section, made of Jastropha curcas wood, the Kiri of Japan. Six strings tightened by buttons; fourteen frets. On the bottom a verse by a Chinese scholar is engraved; ornamentation of bats and fretwork characters appear on other portions.

Pl. XXV. Length, — inches.
Seoul, Korea, 1885. 93569
Collected by Ensign J. B. Bernadou, U. S. Navy.

This instrument resembles the Japanese koto and is played like it with the plectrum. It is placed horizontally on the floor when in position for playing. Koreans regard it quite an accomplishment to master this instrument.

DULCIMER (Yang-gum). Flat, hollow box of o-dong wood, trapezoidal in shape, with lid. Twelve groups of four thin brass wires each are stretched across the box over and beneath two diagonal bridges. Iron pegs and tuning keys. Pl. XXVI.

Length, 22 inches; width, 6¾ inches; height, 3¾ inches.
Seoul, Korea. 130889
Collected by Dr. H. N. Allen.

Played by striking the strings with a thin strip of bamboo, the dulcimer being held by placing the forefinger in a hole beneath the box and resting it on the tips of the fingers and thumb. The long side is held toward the body, and the forward and middle sections of the strings are used. This instrument is much in favor among the educated class and is used for both instrumental pieces and accompaniment.

PUBLIC CONVENIENCE AND SAFETY.

GUIDE POST (Jang-sung). Rude post with grotesquely carved human face. When complete it is crowned with a hat, has large ears, and thin strips along either side represent clothing. Pl. XXVII.

Length, 29¼ inches.
Seoul, Korea. 129484
Collected by P. L. Jouy.

Placed along country roadsides at intervals of half a mile. Complete specimens are about 6 feet high, are painted, and bear on the front an inscription showing the distances. It is believed that this jang sung is a shamanistic idol to the spirits of the place as well as a guide post.

THE ART OF WAR.—WEAPONS AND ARMOR.

ARMOR (Gap-ot). Consists of a coat, helmet, and wide belt made up of many thicknesses of coarse, cotton cloth, covered with yellow stuff. The coat is made up of two wide flaps connected by a band,

ARMOR—Continued.

which passes over the left shoulder. These flaps are cut out to fit the neck and have tying strings at either side. A plastron of cloth is hung over the chest. The surface of portions of the coat is printed with Sanskrit dharani or prayers for victory. A belt resembling those worn by Korean women at the present time, but much thicker, is intended to be tied around the waist. The helmet is thickly padded and stiffened by four perpendicular bands of iron riveted through the cloth and terminating in a brass bell at the top. There is an iron visor in front. There are wide and heavy epaulles, or shoulder protectors, one on each side and at the rear. The helmet also bears Sanskrit and Korean prayers for victory. Pl. XXVIII.

Length of coat, 34 inches; width, 30 inches. Length of belt, 54 inches; width, 11 inches. Height of helmet, 12 inches.
Korea. 128344
Deposited by Dr. G. Brown Goode.
This kind of armor has been in use in Korea for three hundred years, but is not now employed (Soh). The specimen is very old. Korean infantry were equipped with this armor up to a short time ago (Griffis's Corea, p. 417). The Chinese made use of padded armor, but it seems never to have been employed in Japan.

ARROWS (Hual-sal). Bamboo shafts, iron heads, triple feathering; the long ones are used by bowmen, the shorter ones with heavy heads are for children's games. Pl. XXIX, figs. 1, 2, and 3, upper portion of plate.

Length, 20 to 32¼ inches.
Seoul, Korea. 130878
Collected by Dr. H. N. Allen.
The arrows in a quiver are always numbered.

CASE WITH ARROWS (Jun-dong). Arrows same as 130878. Case of stiff, waterproof paper, with cap cover and wooden ends. Decorated with a conventional design in India ink. Pl. XXIX, fig. 4.

Length of case, 35 inches; arrows, 33¼ inches.
Seoul, Korea. 153611
Collected by W. W. Rockhill.
This case or quiver is the regulation one carried by the Korean soldiery.

QUIVER (Jun-dong). Bamboo cylinder carved with flowers and birds in low relief on a lacquered ground. Cap with hinge; two cleats by which the suspending string is fastened. Pl. XXIX, fig. 5, lower line.

Length, 45 inches.
Seoul, Korea. 130878
Collected by Dr. H. N. Allen.
Carried over the shoulder. The bow and arrow are not commonly in use in Korea at present.

EXPLANATION OF PLATE XXVIII.

ANCIENT KOREAN ARMOR.

ARMOR. Consists of a coat, helmet, and wide belt made up of many thicknesses of coarse cotton cloth, covered with yellow stuff. The coat is made up of two wide flaps connected by a band which passes over the left shoulder. These flaps are cut out to fit the neck and are tied at either side. A plastron of cloth is hung over the chest. The surface of portions of the coat is printed with Sanscrit dharani, or prayers for victory. A belt resembling those worn by Korean women at the present time, but much thicker, is tied around the waist. The helmet is padded, and is stiffened by four perpendicular bands of iron riveted through the cloth and terminating in a brass bell at the apex. Visor, small; wide and heavy épaules, one at each side and at the back. The helmet has also Sanscrit dharani written upon it. Length of coat, 34 inches; width, 30 inches. Length of belt, 54 inches; width, 11 inches. Height of helmet, 12 inches. (Cat. No. 128344, U. S. N. M. Korea. Deposited by Dr. G. Brown Goode.)

ANCIENT KOREAN ARMOR.

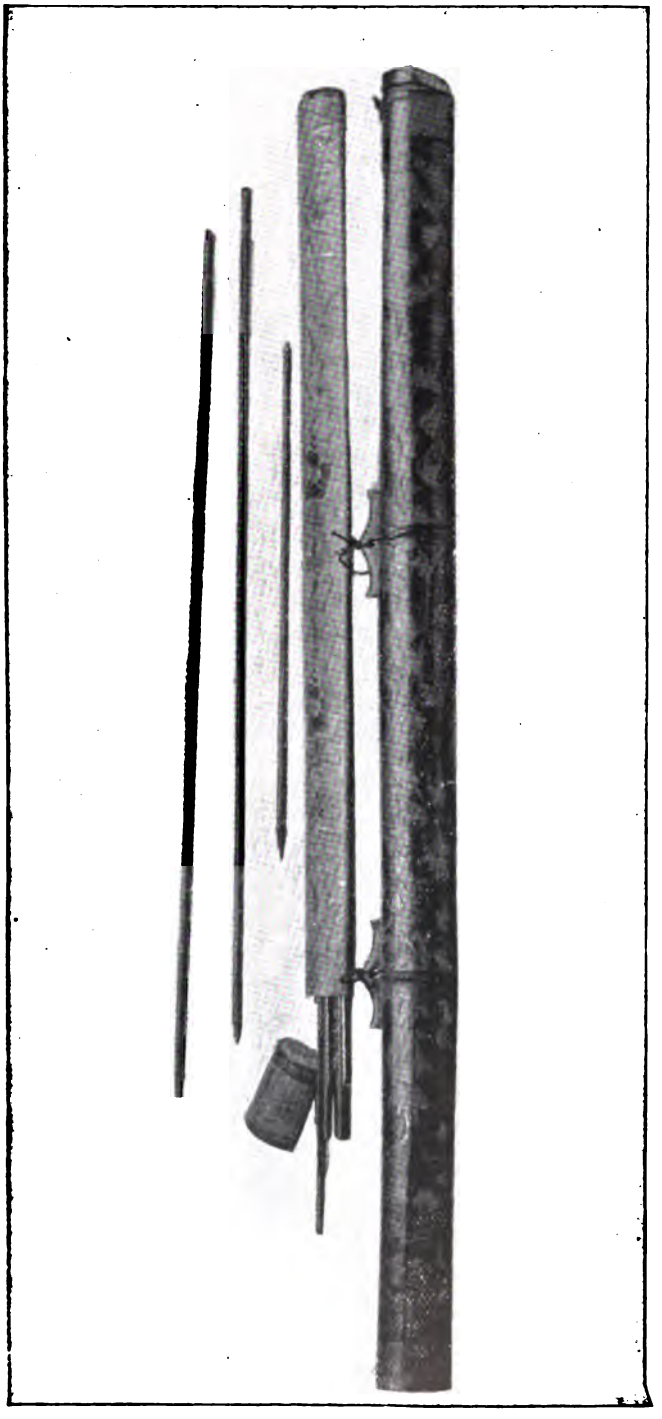
EXPLANATION OF PLATE XXIX.

KOREAN ARROWS AND QUIVER.

Figs. 1, 2, and 3. ARROWS. Bamboo shafts, iron heads, triple feathering; the long arrows are used by bowmen, the short one for children's games. Shorter arrow, 20 inches long; regular arrow, 32¾ inches long. (Cat. No. 130878, U. S. N. M. Seoul, Korea. Collected by Dr. H. N. Allen.)

Fig. 4. CASE WITH ARROWS. Contains numbered arrows like those described above. Case of stiff, water-proof paper with cap cover and wooden ends. Decorated with a conventional design in India ink. The regulation case carried by the Korean soldiery. Length of case, 35 inches; arrows, 33¾ inches long. (Cat. No. 153611, U. S. N. M. Seoul, Korea. Collected by W. W. Rockhill.)

Fig. 5. QUIVER. Bamboo of cylinder carved with flowers and birds in low relief on a lacquered ground. Cap carved with spirals; brass hinge; two cleats fastened on side of tube for the suspending cord. Length, 45 inches. (Cat. No. 130878, U. S. N. M. Seoul, Korea. Collected by Dr. H. N. Allen.)



KOREAN ARROWS AND QUIVER.

SWORD (Hwan-do). Hilt and scabbard of hard wood with elegant fretted, foliated carving, illustrating the ten long lives, viz, sun, moon, swans, deer, etc. Mounted with copper gilt fittings; spring in hilt holds sword in place. Blade, curved. Pl. XXX, lower figure.

Length, 25¼ inches; blade, 17¼ inches.
Seoul, Korea. 151601
Collected by P. L. Jouy.
Worn by all officers in uniform. Such swords are made to order in the districts of Jun-ju and Na-ju.

MATCHLOCK GUN (Chong). Short stock of hard wood; octagonal barrel; smooth bore. Match of twisted tow. Pl. XXXI.

Length, 4 feet.
Seoul, Korea. 151280
Collected by W. W. Rockhill.
Held upon the shoulder when firing, not against it. These guns were used in Korea from about three hundred years ago up to 1881. Some troops still are armed with them.

PRIMING HORN (Oui-iak-tong). Tip of a horn with orifice closed by a spring of horn. Pl. XXXI, fig. 1, lower line (commencing at the left).

Length, 3¾ inches.
Korea, 1871. 72899
Collected by Wm. B. Brooks, U. S. Navy.
Resembles the Burmese primer. (See Jour. Society of Arts, Jan. 26, 1886, p. 351.) A relic of the skirmish of June, 1871.

BULLET BAG (Chong-al-nut-nun-gut). Two thicknesses of coarse cotton. The bullets are sprung out from a bird's bill device. Pl. XXXI, fig. 2, lower line (commencing at the left).

Length, 9 inches.
Korea, 1871. 72898
Collected by Wm. B. Brooks, U. S. Navy.
Trophy of the engagement of June, 1871.

POWDER CASE AND CHARGER (Iak-tong). Octagonal box of Jastropha curcas wood, in rude imitation of a turtle. The charger, an ivory tube, slides into a recess in front of the case. Pl. XXXI, fig. 3, lower line (commencing at the left).

Length, 6¼ inches; width, 4¼ inches; height, 2¼ inches.
Korea, 1871. 72900
Collected by W. B. Brooks, U. S. Navy.
This is a trophy of the engagement of June, 1871, between the United States fleet, under command of Admiral John Rodgers, and the Koreans.

MILITARY BADGE (Hyoung-pai). Two squares of blue silk, embroidered. Design, the Manchurian white crane flying in the clouds, holding a spray of "immortal" grass in its beak. The stitch is mainly plain embroidery, or plumage stich, but some Kensington and stem stitch is used. The embroidery is well done.

Ten inches square.
Seoul, Korea, 1885. 77030
Collected by Ensign J. B. Bernadou, U. S. Navy.
The design is purely symbolic. The crane holds in its bill a sprig of grass,

EXPLANATION OF PLATE XXX.

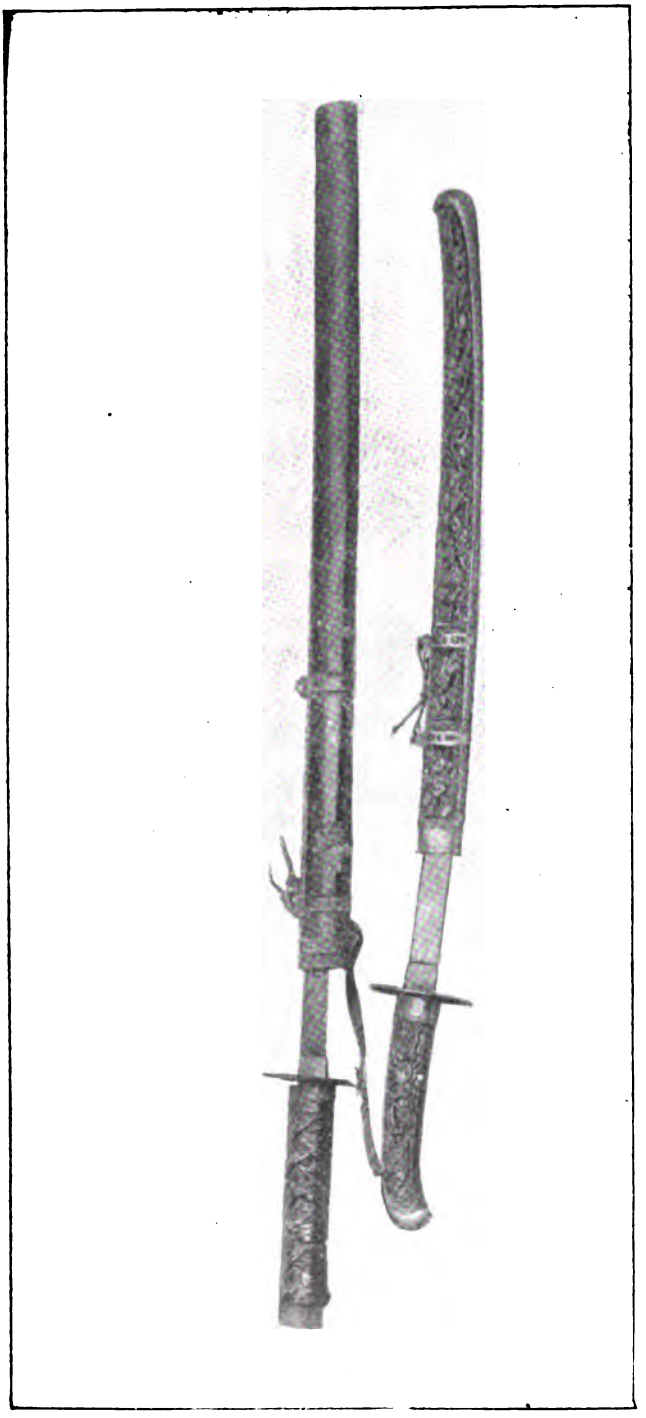
KOREAN SWORDS.

(Upper figure.)

Fig. 1. SABER. Straight, heavy, iron blade. Guard, an octagonal plate of iron; hilt, wrapped with enameled leather; scabbard, wood covered with lacquered flaxen canvas. Bound with brass; a poorly made weapon. Captured in 1871 by United States naval forces. Length, 33½ inches; blade, 1 inch wide; ¼ inch thick at back. (Cat. No. 72897, U. S. N. M. Korea. Collected by W. B. Brooks, U. S. N.)

(Lower figure.)

Fig. 2. SWORD. Hilt and scabbard of hard wood, with elegant fretted, foliated carving, illustrating the ten long lives, viz., sun, moon, swans, deer, etc. Mounted with copper gilt fittings; guard, perforated iron in conventional pattern; spring in hilt holds; sword in scabbard. Blade of steel; graceful curve. Worn by officers. Length, 25½ inches; length of blade, 17½ inches. (Cat. No. 151601, U. S. N. M. Collected by P. L. Jouy.)



KOREAN SWORDS.

EXPLANATION OF PLATE XXXI.

KOREAN GUN AND ACCOUTREMENTS.

(Upper figure.)

Fig. 1. MATCH-LOCK GUN. Short stock, of hard wood; octagonal barrel; smooth bore. Trigger and sights. Stock decorated with bands of cherry bark. Match of twisted tow. Held upon the shoulder when firing. Length, 4 feet. (Cat. No. 151280, U. S. N. M. Seoul, Korea. Collected by W. W. Rockhill.)

(Lower line, commencing at the left.)

Fig. 1. PRIMING HORN. Tip of a horn with orifice in the point closed by a strip of horn forming a spring and allowing a few grains of powder to fall out upon pressure. A relic of skirmish of June, 1871. Length, 3¼ inches. (Cat. No. 72899, U. S. N. M. Korea. Collected by W. W. Rockhill.)

Fig. 2. BULLET BAG. Two thicknesses of coarse cotton. The bullets are sprung out from a bird's bill device in wood. A relic of 1871. Length, 9 inches. (Cat. No. 72898, U. S. N. M. Korea. Collected by W. B. Brooks, U. S. N.)

Fig. 3. POWDER CASE AND CHARGER. Octagonal box of jatropha curcas wood, in rude imitation of a turtle. The charger, an ivory tube, slides into a recess in front of the case. A relic of 1871. Length, 6½ inches; width, 4½ inches; height, 2½ inches. (Cat. No. 72900, U. S. N. M. Korea. Collected by W. B. Brooks, U. S. N.)

KOREAN GUN AND ACCOUTREMENTS.

MILITARY BADGE—Continued.

which confers immortality upon its possessor. At the base of the square are overlapping circles representing waves, often seen at the bases of Japanese and Korean vases and on money typical of circulation. These waves dash against the living rock. In the midst of the waters stands a rock covered with immortal grass and bearing a "Buddhist cross" or swastika. Worn by civil officers of the lower house. One of the squares is attached to the front and one to the back of the officer's robe.

GOVERNMENT AND LAW.

OFFICER'S BATON (Dung-cha). Rod covered with shagreen bound with silver ferules; the part held in the hand covered with wash leather. A tie of blue woolen fabric with a loop for the wrist and pendants of light blue silk are attached to the baton.

Length, 30 inches.
Seoul, Korea. 151171
Collected by W. W. Rockhill.
Carried only with full dress uniform. In old times the baton was made of bamboo, to which was attached thongs of leather, serving in battle as a whip and also used as a drinking tube. It is only displayed for ornament at the present.

KOREAN NATIONAL FLAG (Gook-gi). White silk, with the national symbol (ta-guk), two comma-shaped spirals filling a circle in red and blue, and four geomantic signs (pal-qua) at the four corners of the flag.

Length, 14 inches; width, 21 inches.
Seoul, Korea, 1884. 151638
Collected by P. L. Jouy.
This flag was adopted in 1881.

BUTTON FOR SOLDIER'S HAT (Gui-don). White soapstone, circular; carved on one surface with the national symbol.

Seoul, Korea, 1884. 151629
Collected by P. L. Jouy.
For decorating the hat of the common soldier.

PEACOCK FEATHER ORNAMENT (Kong-tjang-mi). Bunch of feathers arranged in fan shape and inclosed in a lead swivel button pierced for suspension.

Length, 8 inches.
Seoul, Korea, 1885. 77036
Collected by Ensign J. B. Bernadou, U. S. Navy.
The peacock feather in Korea and China is a sign of official rank or promotion. This ornament is worn by military officers and by soldiers of certain guards near the King.

SCIENCE, RELIGION, EDUCATION, AND HUMAN ACHIEVEMENT.

RELIGIOUS CEREMONIAL OBJECTS.

IMAGE OF BUDDHA. Stone figure heavily gilt. Buddha in contemplative attitude seated on the lotus. Base, painted red. Well carved.

Height, 14 inches.
Korea, 1885. 151600
Collected by P. L. Jouy.
The black line over the forehead shows the degree of Saint or Lower Buddha in wisdom. Obtained from a monastery in Tong-na.

PRAYER BEADS (Yum-ju). A rosary of 108 beads made of nuts. Some of the larger beads at the beginning and divisions are made of glass and wood.

Korea. 151612
Collected by P. L. Jouy.
The regular Buddhist rosary used by priests.

FIGURE OF TIGER GOD (Ho-rang-i-san-sin). Wooden image, rudely carved, representing a tiger in erect position with fore legs held up. Painted and gilded.

Height, 6⅛ inches.
Monastery at Wonsan (Gensan), Korea, 1885. 131608
Collected by P. L. Jouy.

CENSER (Hiang-no). Bronze; globular vase supported on three figures. Lid pierced and surmounted by figure of Shishi, the Sky lion.

Height, 4¼ inches.
Seoul, Korea. 151618
Collected by P. L. Jouy.
Used in the temple service. It should be set upon the table so that one foot goes in front and two behind.

TEMPLE BELL (Mok-tak). Block of hard pine hollowed out in center to leave two thin sounding plates. Striker, a stick 7 inches long. Patches of fiber cloth are glued over the upper parts of the orifice to increase the resonance and also to prevent splitting.

Height, 5⅛ inches; width, 3 inches.
Wonnsan (Gensan), Korea. 151619
Collected by P. L. Jouy.
Of the form known in Japan as suzu. It is used by Buddhist priests in some services in the temple, where it is applied for ordinary religious performances, while the larger bronze bell is reserved for a higher ceremony. In the temple this bell is sounded at the beginning and end of the meal. Priests while traveling carry a bell like this specimen.

MAGICAL FORMULA (Dharani in Sanscrit, Tanini in Korean). Buddhist prayers in Sanskrit characters buried with the dead.

Length, 10½ inches; width, 6¾ inches.
Korea. 151699
Collected by W. W. Rockhill.
Written in Sanskrit of the Nepalese style; prepared by Buddhist priests and sold to believers. At the time of burial the papers are placed on the heart of the corpse under the clothing to propitiate spirits.

KOREAN EXPIATORY OFFERING.

EXPLANATION OF PLATE XXXII.

KOREAN EXPIATORY OFFERING.

STRAW MAN. Bundle of straw tied with hoops of straw into the outline of the head and trunk of a man. Arms and legs fastened to the body. Some bits of money are put in this figure, and it is thrown away under the impression that the influence of an evil star may be overcome when the image is torn to pieces. Length, 27 inches. (Cat. No. 77051, U. S. N. M. Seoul, Korea. Collected by Ensign J. B. Bernadou, U. S. N.)

BOOKS AND LITERATURE.

Korean thought has always been directed through the channels of Chinese learning. There apparently never was a characteristic literature of Korea; the whole plan of education is Chinese, and the language of the country, with its beautiful alphabet, is correspondingly neglected. Korean scholars are as proficient in the Chinese classic style as those of China itself. Books printed in the common character are few and little read.

The education of the child begins with the alphabet. He must commit to memory the "Thousand Character Classic," a Chinese rhymed vocabulary of so many words, no two alike. For the pupil it is arranged thus: the Chinese character, its meaning in Korean and its Chinese name in Korean. After reading this three times the student begins to write. The remainder of the course is in ordinary Chinese schoolbooks. (See Ross's Corea, p. 306.)

SCHOOLBOOK. Title, "Elegant phrases accorded to classes, copied complete." Consists of the "Thousand Character Classic" or "door," the "Hundred Family Names," "Correct and Colloquial Variations of Chinese Pronunciation and Chinese Conversations in Chinese, Transliterated with the Korean Letters." Most of the book is taken up with "Chinese phrases and terms", beginning with Astronomy and Meteorology, embracing many subjects, including Divination. 41 leaves.

Seoul, Korea, 1885. 77122
Collected by Ensign J. B. Bernadou, U. S. Navy.

KOREAN BOOK. Entitled in Chinese "Sicuo Myo yo ri. Mun tap." Holy, excellent, important doctrine. Questions and answers.

Seoul, Korea, 1884. 77120.
Collected by Ensign J. B. Bernadou, U. S. Navy.
A catechism issued by the Jesuits.

SANSKRIT-CHINESE-KOREAN BOOK. Entitled "Pi mih Kiao," or "Secret religion." Made up of magical formula or dharani, written in a kind of Sanskrit resembling Nepalese, which to the uninitiated is secret or hidden. Two prefaces, one written under the *nom de plume* of "Hia Shan, pu Lao Sou," or the "Summer Hill Old Vagabond," dated 1644. Second preface was written by a Buddhist monk of the monastery of Fuh Lin Shan, date July, 1652. Book is without title-page or colophon. Printed in Korea, on native paper.

Buddhist Temple of Pong-yang, Korea, 1885. 77121
Collected by Ensign J. B. Bernadou, U. S. Navy.
The book begins with the "ŏn-moun," or Korean alphabet, said to have been invented about the eighth or ninth century of our era by a bonze named Syŏl-chongi. The sounds of this are defined by Chinese characters, for which the student is directed to substitute the sound of the corresponding word in the Korean colloquial language. The bulk of the book is taken up with prayers, (dharani) addressed to Avalokitshwara, and begin with ôm or ôm-mani padmê-

SANSKRIT-CHINESE-KOREAN BOOK—Continued.

hûm. The "secret" or "mysterious" characters are a modification of the Sanskrit alphabet ascribed to Brahma, and seem to be identical with those used in the Sanskrit books, said to have been brought to Japan by Kobo Daishi early in the ninth century.—(Dr. D. B. McCartie.)

MANUSCRIPT BUDDHIST RELIGIOUS WORK. Taipo-pumo-eun-tchyang-kying, "Parents' very precious evening-bell prayer book." Written in Korean characters of the square or book form. It contains tales of the life of Buddha for popular instruction in Buddhism; 74 pages.

Size, 14 by 8⅛ inches.
Seoul, Korea, 1885. 77123
Collected by Ensign J. B. Bernadou, U. S. Navy.
Good paper and excellent writing; most probably that of a lady.

MANUAL OF THE FOUR RITES. The Sa-ryei-pyel-lam, a Chinese work giving description of the ceremonies of capping, or assuming the cap of manhood; marriage; death and burial, and sacrifices to ancestors. Four volumes.

Seoul, Korea, 1885. 77124
Collected by Ensign J. B. Bernadou, U. S. Navy.
This is the great Chinese handbook of etiquette.

KOREAN PRINTED BOOK FOR CHILDREN. A text-book used in schools; title, "The five rules of deportment" (O-run-hang-sil). Biographical accounts of persons, principally Chinese, who believed in the five moral sentiments of Confucius. Printed in Korean and Chinese characters; date, 1876; illustrated.

Size, 12½ by 8½ inches.
Seoul, Korea. 130585
Collected by Ensign J. B. Bernadou, U. S. Navy.
The five rules are: 1. Honor to parents; 2. Love to brothers; 3. Love to neighbors and friends; 4. Love of country; 5. Love of wife and children. Korean children over ten years old read this book and learn morals and religion from it. It is the custom of the King on the 1st of January to order the head of the bureau of education (Mr. Kim, in this instance) to print a large number of copies of this work and to distribute them to the boys of the district schools. This book is interesting for the glimpse it gives of the Korean educational system.

MANUSCRIPT KOREAN BOOK. "The war between Korea and Japan." (Im-jin-lok.) Clearly written in native characters on fine paper.

Size, 9½ by 7 inches.
Seoul, Korea, 1884. 130583
Collected by Ensign J. B. Bernadou, U. S. Navy.
This is an abridgment of an official history of the war near the close of the seventeenth century, in 70 volumes. The account is incorrect.

KOREAN BOOK. "An account of the Eastern nations." (Ye-un.) Native characters, paper, and style.

Measurements, 12½ by 8 inches.
Seoul, Korea, 1884. 130584
Collected by Ensign J. B. Bernadou, U. S. Navy.
This book was written about ten years ago, in order to mold the rising sentiment in favor of Western civilization.

GOSPEL OF MARK (Maga-jun). Printed in Korea upon Japanese paper. Translated from English into Korean.

Length, 8¼ inches; width, 5⅛ inches.

Seoul, Korea. 130882

Collected by Dr. H. N. Allen.

NOVEL (Hung-boo-jun). Printed on cheap native paper.

Length, 19½ inches; width, 7⅛ inches.

Seoul, Korea. 130881

Collected by Dr. H. N. Allen.

Popular wonder story of the brothers Hung-bu and Nol-bu. Dramatized in Korea. Translated by Dr. Allen in "Korean Fairy Tales."

MAP OF SEOUL, THE KOREAN CAPITAL. Drawn by a native. Colored; very poor cartography, not drawn to scale, and having no profile hatchings.

Size, 26½ by 40 inches.

Seoul, Korea, 1885. 77067

Collected by Ensign J. B. Bernadou, U. S. Navy.

Shows Nam-san, or South Mountain, where signal fires are lighted nightly, also the Ponk-an, or North Fortress, and the walls and gates of the city. The two principal streets are also shown, and the streams indicated as running through the city are in reality wide ditches, in which refuse is thrown, and which are only thoroughly cleaned out at the time of the heavy summer rains. These ditches are spanned by heavy stone bridges. The extensive grounds of the King's palace are also shown.

SHINTO, OR THE MYTHOLOGY OF THE JAPANESE.

By ROMYN HITCHCOCK.

Old records—Kami—Heaven—Generation of Kami—Creation of the world—The legend of hades—Birth of the Sun-Goddess and of Susano—Myth of the Sun-Goddess—The Susano myth—The sacred sword of Ise—Heavenly princes sent to subdue Terrestrial deities—The Mikado's divine ancestors—The first Mikado—Shinto as a religion—Influence of Shinto upon the national character—Liturgies and form of worship—Tendency of religious thought in Japan.

Authentic history in Japan begins only in the fifth century. Whatever is earlier than that belongs to the age of tradition, which is supposed to maintain an unbroken record for ten thousand years. Intercourse with Korea is said to date from the middle of the second century B. C. The Emperor Sujin (97–30 B. C.) is reputed to have received tribute from several Korean states; but the art of writing was not introduced until about the fifth century, and it is scarcely credible that a progressive and imitative people like the Japanese would have neglected such a useful accomplishment for five centuries after having seen it practiced in Korea. These dates are therefore doubtful. We may infer that the earliest intercourse between China and Japan was about the time when Chinese writing was introduced.

Previous to that time the national religion of the Japanese was a very simple form of ancestral worship combined with nature-worship, founded upon a most remarkable and complex mythology which ascribed to the people divine origin and descent. It is this faith which is now known by the name Shinto. The word is of Chinese origin, but it is obvious that the cult which it designates must have developed many centuries before any trace of Chinese influence was felt in Japan. Since then, however, Shinto has changed so much in its ceremonials and external character that it is now scarcely to be found in its original simplicity in any part of Japan. Indeed, it is only by the study of the oldest books that we have come to know fairly well what pure Shinto was. First came the teachings of Confucius, which spread rapidly and were received with the greatest favor throughout Japan. At the present day they still constitute an essential part of a Japanese education. Then came a few Buddhist images and sutras from Korea, in the year 552 A. D.;* but it was not until the famous priest, Kobo Daishi, in the

* As related in the Nihon-gi.

ninth century, ingeniously identified the various Buddhist saints with the Shinto deities, that the new faith became popular and finally almost supplanted the other. Then arose different schools of Shinto, and now we find the two religions borrowing from each other, until it is sometimes confusing to decide whether a certain temple is Buddhistic or Shinto, or both.

The popular mythology of Japan suggests to the mind fabulous beasts and dragons, rishi and sennin—old men of the mountain solitudes having magic powers—imps, and innumerable spirits of earth and air. But most of these have come from China or distant India. They have no place in the primitive worship of the people. Even so it is with the ancient books, for they too were compiled at a time when Chinese ideas had begun to influence the imagination of the writers, and all of them require the most critical study to eliminate foreign elements. To learn what the native beliefs were, it is necessary to adhere strictly to purely Japanese accounts, industriously comparing different texts in order to discover what was originally a part of the records. This the Japanese scholars have faithfully done. The difficulties have been very great. Although writing was originally introduced from China or Korea, there is a style of composition which from the beginning has been distinctively Japanese. But the old language is very different from that now in use. It is difficult to understand, the sense is often obscure, and there are many words handed down from very ancient time, the meanings of which were already forgotten by the old transcribers, who wrote them down phonetically.

The oldest Japanese book known is the Ko-ji-ki, Record of Ancient Matters, a translation of which, by Prof. Basil Hall Chamberlain, was published in the year 1882. The original work dates from 711 A. D. The Emperor Temmu (673–686 A. D.), desiring to preserve the ancient traditions in a pure form, had the records of the chief families examined and compared. A member of his household committed the whole to memory. After the death of the emperor, the Empress Gemmio (708–714 A. D.) had the record written down as it was recited.

The authenticity of this book as a true record of the ancient lore of Japan is too strong to be questioned. It relates a mythology remarkably complex and fantastic, but withal consistent and connected. Its age can not be estimated. It must have grown through many centuries, for when the Ko-ji-ki was written, it was a completed system and the origin and meaning of its rich symbolism had been already forgotten. Some of the language is certainly older than the sixth century and some dates from before the fourth.

Next to the Ko-ji-ki there is a larger but less reliable work, the Nihon-gi, or Chronicles of Japan, dated 720 A. D., which is more affected by Chinese influences. There are also numerous commentaries by Japanese scholars. The Nihon-gi has not been translated, but in the Annales des Empereurs du Japan (Nipon o daï itsi ran), by Klaproth, 1834, a portion is translated with suggestive notes.

Next in value to the translation of the Ko-ji-ki we have the extended review of the writings of Japanese scholars, with quotations from their works, by Mr. E. M. Satow. There are other disconnected sources of information, but most of our knowledge of the native literature of Shinto is due to the patient and thorough work of Chamberlain and Satow.

KAMI.

The Shinto mythology is an account of the divine ancestry of the Mikado and his people. It is traced back to the creation of the world. These divine ancestors, the spirits which inhabit their heaven or still reside in temples and wayside shrines controlling the affairs of mortals, are known as "kami." The word is usually translated "deity" or "god," but our language has no proper equivalent. Kami are only superior beings. They may be either heaven-born, celestial deities, or the departed spirits of emperors, wise men or heroes. It is doubtful if immortality is one of their attributes. Some of them, we are told, die or disappear. They are by no means always good or virtuous, but they possess many human characteristics.

The Mikado joins the innumerable company of kami after death. Departed ancestors are the kami of the family and these dwell around the household shrine. There are kami to be worshiped by all the people, others of only local importance; some are near and others so distant that it is not worth while to think of them.

Whatever object, animate or inanimate, is supposed to possess mysterious or supernatural powers may be called kami. "The fox and the dragon and goblins are eminently miraculous and dreadful creatures." The fox has a very prominent place in the folk-lore of Japan, and his influence upon men is greatly feared. Hence there are many shrines to the fox kami in the land.

The phenomena of nature, such as thunder and lightning, inanimate objects, rocks, seas, mountains, rivers, plants and trees, may be designated kami. Often there seems to be no thought of impersonation. The kami may be the thing itself, or at other times a mysterious power that dwells or moves therein.

In certain other respects a kami is a remarkable conception. By a peculiar partitive process, not easily understood, the powers or qualities associated with an individual kami may be divided and exercised by several distinct personalities, which are, at the same time, integral parts of the original conception. In other words, a single deity may be worshiped under different names, which designate specific attributes or functions of that deity, and each of these names may be applied to a separate personality. As an example, the Goddess of Food, Toyo-uke-bime (Abundant-Food-Lady), also known as Uke-mochi-no-kami, or Food Possessor, is worshiped as Kuku-nochi-no-kami, Producer of Trees, and as Kayami-hime, the Parent of Grasses. This deity is perhaps, as Satow suggests, a personification of the earth. As a more

curious and striking illustration of the exercise of different functions under changed personality, we may refer to O-kuni-nushi, who was once the great ruler of the world. He was overcome and deposed, as we shall learn further on, and became the chief deity of Hades. In this capacity he is worshiped also in two other characters—as a Gentle Spirit which pardons and as a Rough Spirit which punishes. These two spirits have separate existences. At one time, while the deity was engaged in the task of civilizing the world, and was in need of assistance, another deity came to him from the sea and proffered aid. O-kuni-nushi did not recognize him and asked who he was. The deity answered, "I am thy saki-tama," meaning thy spirit that confers blessings.

HEAVEN.

Like many other peoples, the Japanese believe that heaven was once very near the earth, but they have no account of how it became separated from and raised above the world. Formerly it was connected with the earth by means of a "floating bridge" or a "rock boat," or a "pillar of earth," whereby the kami could pass from one place to the other at will. The nature of this connection is very vaguely expressed in the records. Satow conceives that the "floating bridge of heaven" was the wind.

Heaven itself was the abode of the celestial kami, but it was freely visited by the kami who lived on earth. It was not boundless space, for its area was limited. Susano made the circuit of its boundary. It was a counterpart of what was known on earth—a country like Japan in the blue sky, having a great river with a stony bed, such as the traveler in Japan knows very well, a mine from which iron was taken for the sacred mirror and fertile fields which furnished seed for the terrestrial harvest. It was not regarded as a bourne where the souls of the dead would find a resting place. It was only the particular abode of those kami of the early generations who are distinguished as the celestial kami.

GENERATION OF KAMI—THE CREATION OF THE WORLD.

The preface to the Kojiki begins thus: "Now when chaos had begun to condense, but form and force were not yet manifest and there was nought named, nought done, who could know its shape? Nevertheless, heaven and earth first parted, and the three deities performed the commencement of creation; the passive and active essences* then developed and the Two Spirits became the ancestors of all things." To learn the origin of the first three deities we must turn to the Kojiki

* The preface is not a part of the original work, but a sort of introduction or general review by the author of the written copy. It embodies some ideas of his own, which, as this allusion to the "passive and active essences," are foreign to the book itself.

. They were born, as it were, spontaneously, "in the Plain of Heaven." They were the Deity-Master-of-the-August-Center-of-en, the High-August-Producing-Wondrous-Deity, and the Divine-ucing-Wondrous-Deity. These three kami were "born alone and ieir persons"—in other words, they disappeared or died immedi-, and we hear of them no more. So with many links in the strange before us, they are formed and disappear before we know their se or design, leaving gaps so blank that no effort of the imagina-an complete the chain. The reader will be surprised at the long urious names of the ancient kami. These names also are a puz-but the time may come when they will possess more significance. the passage above quoted there is a reference to the active and ve essences. This is not a Japanese idea, but essentially Chinese. lustrate how great are the difficulties in the way of eliminating nfluences of Chinese thought from the old books, as well as to l an idea of the style of the works themselves, the following quo-ı from the Nihongi will suffice. Before the earth and heaven had ated, "chaos, having the form of an egg, tossed its waves like an ted sea. It contained, however, the germs of all things; those ı were pure and transparent rose and formed heaven, while those ı were gross and opaque precipitated and formed the earth . . . ine being or kami was born in the midst. An island of soft earth d on the waters. Then appeared a thing like the stalk of a plant ı transformed into a kami . . . the first of seven celestial s."* The story in the Nihongi is far more attractive than the bare d in the Kojiki.

e growing plant is a strange conception, more fully recorded in Kojiki. The latter work tells us that two deities were born "a thing that sprouted up like unto a reed shoot when the , young and like unto floating oil, drifted about medusa-like." strange thing was suspended in space like a cloud. We are told it became the sun, but immediately after we read that as it grew ırds it spread out infinitely as a cloud from a mountain top and ed heaven. A part grew downward and formed the moon. This ry confusing, but it is interesting in connection with the myth of sun-goddess, indicating that the sun existed long before the birth materasu, who, by some authorities, is regarded as the sun itself, not as a deity personifying or dwelling in the sun.

great number of kami were born in succession for various more ss obvious purposes, but to enumerate them would serve no useful ose. There was a course of spontaneous generation whereby five ıvenly deities" and seven "divine generations" were produced, all hom, except the last two born, "hid their persons," disappeared or , for all kami are not immortal. These two were named respectively ıgi, "The Male-who-invites," and Izanami, "The Female-who-in-

* Translated *from Klaproth, Annales des Empereurs du Japan.*

vites." They were commanded by the heavenly deities, who gave them a jeweled spear, to create the drifting land. They created the world, which was then only Japan. Standing on the floating bridge of heaven they thrust the end of the jeweled spear into the waste of waters and stirred the brine until it went curdle-curdle, and the drops that fell from the spear piled up and became the island Onogoro. now unknown.

The expression "bridge of heaven" is variously interpreted by authors. Some take it literally as meaning an actual bridge between heaven and earth. The word *hashi* signifies not only a bridge, but it may apply to anything which fills or bridges over space. The Sun-goddess, as will be seen, traveled from earth to heaven on the *Ame-no-mi-hashira*, which may be the wind. But most native authorities regard it as a more substantial structure, for we read of the heavenly rock-boat, *Ame-no-iha-fune*, and also of stairs, reminding one of Jacob's ladder, while a later conception is a pillar of earth which afterwards fell and formed a range of high mounds in Harima, near Miyadzu, in Tango. The length of this range is 22,290 feet—presumably the distance from earth to heaven in the olden time.

The two creator gods descended from their place upon the island they had made, and after a short courtship, the details of which are too objectionable for translation, they gave birth to a child without bones, cartilagenous and unable to walk. This child, well known to the Japanese as Hirugo, also named Ebisu, one of the household gods, they placed in a basket of reeds and let him float away like a Japanese Moses. He did not die, but his story is too special for consideration here. They then gave birth to the eight* islands of Japan, beginning with Awaji at the eastern entrance to the Inland Sea.

The first island born to this couple was named Aha, but for some reason this, like the child Hirugo, was not perfect. The parents inquired of the Heavenly Deities why this was so. The latter resorted to divination and they soon discovered the reason. When the creator gods descended upon the mythical Onogoro, they walked around it in opposite directions, and when they met the woman was the first to speak. This was apparently contrary to the etiquette of even those early days, and it was impossible to make a good world if the deities were so careless of proper ceremonies. They then went around again as before, when the man spoke first, with subsequent satisfactory results.

After giving birth to the eight islands, they begot a long series of deities to govern them, and for a long time, as we may infer from sub-

*The number eight frequently occurs in the Shinto mythology and seems to be the most perfect and fortunate number. Japan was known as "the land of the eight great islands." Yezo was then unknown. There was a serpent with eight heads and eight tails; there were eight thunder deities, and in the myth of Amaterasu there is described a string of jewels eight feet long; there were eight hundred *myriad* deities, etc.

sequent allusions in the records, Japan was inhabited by deities, good and bad, who only gave up their authority in the land to make way for the ancestors of the Mikado and his people. But it would be tedious and unprofitable to even repeat the names of the immediate family of Izanami and Izanagi. It is rather a large one and few of its members are still known to fame. But as an illustration of the manner of naming the ancient deities, which, although I am informed it is not strictly peculiar to Japanese mythology, is certainly one of its extraordinary characteristics, several names will be given with Prof. Chamberlain's translations. Such are *Oho-koto-oshi-wo-no-kami*, Deity-great-male-of-the-great-thing; *Iha-tsuchi-biko-no-kami*, Deity-rock-earth-prince; *Kaza-ge-tsu-waka-no-oshi-wo-no-kami*, Deity-youth-of-the-wind-breath-the-great-male; *Tori-no-iha-kusa-bune-no-kami*, Deity-bird's-rock-camphor-tree-boat.* (See also pp. 498 and 502).

Izanami gave birth to thirty-three deities, the last of whom were the Deity-princess-of-great-food and the Fire-burning-swift-male-deity, which, because of his fiery nature, caused the death of Izanami when she bore him. Izanagi was so grieved at the death of his wife that he forthwith drew his sword and cut off the head of the child. From the drops of blood on the sword and from various parts of the body of the child, arose sixteen more kami, but we must pass them by. The Fire-deity, the last born of Izanami, who was so cruelly treated by his father, became immediately the ruler of the under world. Presumably it was his spirit which descended there.

THE LEGEND OF HADES.

When Izanami died she descended to the under world—Hades. The Chinese characters literally mean the "Yellow Stream," the Chinese designation of the under world. It is the habitation of the souls of the dead, for the shintoist has neither a paradise nor a hell. It is a land of gloom and darkness.

To this region Izanagi followed, wishing to see his wife once more. He broke off a large tooth from his comb, and, lighting it as a torch, entered the gloomy portals. His wife sent messengers to prevent his approach, but he persisted in his search until he found her. But her body was a mass of corruption. In her head dwelt the Great-Thunder, in her breast the Fire-Thunder, in other parts of her body the Black-Thunder, Cleaving-Thunder, Earth-Thunder, Rumbling-Thunder, and the Couchant-Thunder, in all the eight thunder deities. Izanami was

*This deity is an example of an inanimate object, a boat, raised to the rank of a kami for important service. This boat is variously described by authors. It is said to be the boat in which the boneless child, Hirugo, was set adrift, already described as a boat made of reeds. The reader must be prepared for some inconsistencies as well as startling conceptions in this narrative. The most the writer can hope for is to give a reasonably intelligible account of the Shinto mythology as a whole, leaving the details to be filled in by future researches.

angry and ashamed to be thus seen by her husband, and ordered the Ugly Female of Hades, the eight thunder deities and a host of warriors to pursue him. He escaped from these, but when Izanami herself took up the chase she overtook him. But he blocked up the Pass of Hades with a great stone, and they stood on opposite sides of it and took leave of each other, or, according to some authors, divorced each other. Izanami could not join her husband because she had eaten food from the fire of Hades. How like this is to the story of Persephone and the pomegranate. We must omit the details of this story.

Dr. J. Edkins is disposed to regard the Japanese conception of the under world as derived from China, in which country it can be traced back to 721 B. C. The divinity Tai-shan was the Taoist ruler of the souls of the dead. Fire worship, which Dr. Edkins refers to in this connection, although not unknown in Japan, does not appear to have been much practiced. When Izanagi descended to Hades she assumed supreme authority. As she undertook the pursuit of Izanagi, she feared to leave the fire deity to his own devices, lest he should do harm to the world. So she created the deities of clay and of water to restrain him. This fire deity plays but a very small part in the mythology; even his period of rule in Hades was very short. The most we can say regarding fire worship is, that a peculiar form of fire-drill is known in Japan, which was used once a year until quite recently at one of the Idzumo temples for producing fire. This apparatus has already been described by the writer.* Another similar drill is in the museum at Tokio. The hypothesis of Dr. Edkins,† that the origin of the Japanese cosmogony is to be found in the fire worship of Persia and the worship of Ormuzd in India, China and Mongolia, about the sixth century B. C., is plausible at first sight; but it is founded upon a presumption of early intercourse between the countries, which, as we have seen, is not borne out by research. Even should it prove true, the development of the Shinto mythology has certainly been in lines peculiarly independent and characteristic. I can not bring myself to admit for it such a comparatively late origin as the sixth century B. C.

The under world of the ancient Japanese may have been quite like the Chinese and Persian idea, but the Japanese of the present day are a progressive people, and with them there is advancement in the under world as upon earth. The Ise pilgrims have many more or less untuneful songs which they chant as they slowly tramp along, and here is one which I heard in the evening at a native hostelry, where I stopped one rainy night, on my pilgrimage to the ancient shrines. It was written down for me by the pretty daughter of the house, and afterwards translated by a student, Mr. K. Nagai.

* See Hough, Walter, "Fire-making apparatus," Report U. S. National Museum, 1888, p. 552.

† Persian Elements in Japanese Legends. Trans. Asiatic Society of Japan, XVI, 1–9.

AN ISE MAIRI.

Now that Hades is enlightened by the knowledge of the present age, the souls of the dead cross the river Sandzu* on steamers, while all places in the realm are connected by a network of telegraph lines. The Jizo (idol of the Buddhists) who reigns in Sai no kawara (where the souls of children go), disguised as a man of the fashionable world, stands among the children in the dress of a modern schoolmaster.

The last line is a sly cut at the village schoolmaster in his foreign clothes.

BIRTH OF THE SUN GODDESS AND OF SUSANO.

Izanagi was defiled by his visit to Hades, and went to a river to cleanse himself. Among the many kami which arose from each article of clothing as he disrobed, and as he bathed, three only deserve extended notice. These are named Amaterasu, the Sun-goddess; Tsuki-yomi-no-kani, the Moon-god, and Susano-no-mikoto, one of the most remarkable personages in this strange mythology.

Amaterasu was born from the right eye of Izanagi. She was bright, splendid, and was appointed to rule the Plain of High Heaven. She received a necklace of precious stones, which reminds one of the *mega-tama* and *kudatama* found in ancient Japanese tombs, and ascended to heaven by the *ame-no-mi-hashira*, where she rules as the Sun-goddess. From her, as we shall see, the Mikado traces his ancestry.

Amaterasu is worshiped as the deity of the sun. The sun is itself regarded as the goddess visible, and yet there is some inconsistency of views in this connection. Light and darkness were known before her birth, for Izanagi required a torch in the under world. When we come to the great myth of the Sun-goddess hiding in a cave, we shall be told that darkness prevailed in heaven and earth until she again appeared.

The Moon-god was born from Izanagi's right eye,† and from his august nose was born Susano, who became ruler of the land. He was a very impetuous and troublesome deity. Not being quite satisfied with his position he began to weep, "and the fashion of his weeping was such as by his weeping to wither the green mountains into withered mountains, and to dry up all the rivers and seas," and the sound of bad deities "was like unto flies in the fifth moon." So Izanagi expelled him from the land, and he forthwith ascended to heaven, whereupon all the mountains and all the country quaked, and the Sun-goddess was alarmed by the great noise. But he said to her, "I have no evil intent. It is only that when the Great-august-deity, our father, spoke, deigning to inquire the cause of my weeping, I said:

* The Buddhist Styx.

† Some Japanese authors maintain that Susano was the Moon-god, born of Izanagi's right eye. According to Chinese lore, the sun and moon were born from the eyes of Puanku.

'I wail because I wish to go to my deceased mother's land' (Hades); whereupon the Great-august-deity said: 'Thou shalt not dwell in this land,' and deigned to expel me with a divine expulsion. It is, therefore, solely with the thought of taking leave of thee that I have ascended hither." Then they swore to each other from opposite banks of the tranquil river of heaven, and from the mist of the breath of each various new deities were born. Two of these are remarkable for their names, which were, His-augustness-truly-conqueror-I-conquer-conquering-swift-heavenly-great-great-ears, and Her-augustness-princess-of-the-island-of-the-offing.

MYTH OF THE SUN-GODDESS.

We now come to the great and most interesting myth of the Sun-goddess. From it may be traced the origin and significance of many customs still followed in Japan, and the meaning of the myth itself is a subject worthy of speculation and research. Susano performed many wicked acts and caused much destruction to fields and watercourses.* In heaven he broke a hole in the roof of the weaving room where the Sun-goddess and other goddesses were at work weaving the garments of the deities. He let fall into their midst a heavenly horse which he had flayed. This caused a great commotion among them and Amaterasu retired into a cave and closed the entrance with a stone. The plain of high heaven was obscured and darkness reigned over the earth. Then the eight hundred myriad† deities assembled in the dry, stony bed of the tranquil river of heaven to devise a means to entice the goddess from the cave. Various plans were proposed, but Omoki-kane-no-kami was a great thinker, and his plan was followed. So they made a mirror of iron from the mine of heaven, in shape like the sun, and a string of five hundred curved jewels eight feet in length, and pulled up by its roots a *Cleyera Japonica* with five hundred branches, upon which they hung the mirror and the string of beads and offerings of white and blue cloth. They then resorted to divination by means of a foreleg of a buck placed in a fire of cherry bark, and examined the crack produced. Then the deity Ama-no-futo-dama-no-mikoto took the tree with its offering in his hands and recited liturgies, while another played on a bamboo flute and another on a kind of harp made by placing six bows with their strings upward,‡ and others kept time by striking two pieces of wood together. Bonfires were lighted, and a deity known as Usume, the Heavenly-alarming-female, placed a circular box or sounding board before the cave and danced upon it as though

* From the narrative one would suppose that Japan was inhabited at this mythical period by people who cultivated the soil, marked out fields, etc. The story of the eight-headed serpent and the old couple with eight children (page 500) and many other allusions lead to the same conclusion.

† The number means a great many.

‡ Doubtless the origin of the *koto*.

possessed, and allowed her clothing to fall, whereat all the assembled deities laughed until the plain of heaven shook.

Hearing the noise and laughter the goddess within the cave was astonished and fain would know the cause of mirth so unseemly during her seclusion. She cautiously peeped out and said: "Methought that owing to my retirement the plain of heaven would be dark; how is it, then, that the Heavenly-alarming-female makes merry and that the deities all laugh?" Usume replied, "We rejoice and are glad because there is a deity more illustrious than thine Augustness." By this was meant the iron mirror, which we therefore infer was a new invention, never before seen by the goddess. At the same moment the mirror was thrust before the face of Amaterasu, whereat she was so astonished that she stepped forth to gaze in it. Then a deity who stood beside the door seized her hand and pulled her forward, when another drew a straw rope behind her and said, "Thou must not go back farther than this." Thus heaven and the Central Land of Reed Plains (Japan) became light once more.

The retirement of Amaterasu may signify an eclipse of the sun, which the Japanese still regard with terror. They light candles, recite prayers, and make a fearful din by beating gongs and kettles to dispel the darkness. Perhaps it symbolizes the change of seasons, Amaterasu representing summer and Susano winter. The meaning is still obscure.

The myth has given origin to many practices which are familiar to persons who have traveled observantly in the country. The cut paper *gohei*, which hang on every temple and every household shrine, often attached to short wands of wood, represent the offerings of cloth on the bush with five hundred branches. The dance of Usume before the cave is undoubtedly represented by the pantomimic *kagura*, danced by young girls at the temples of Ise and elsewhere. The mask of Usume is frequently seen in Japanese homes. The music to be heard at Shinto shrines on any *matsuri* or festival day is of very ancient character, while the bamboo flute and the two pieces of wood are but too conspicuous on all occasions.

The straw rope is to be seen everywhere: on temple gateways, in festoons around shrines, along the fronts of houses, over doorways, usually having *gohei* entwined with it. This is particularly true at the New Year time. The *gohei* are commonly regarded as emblems of purity, while the straw rope protects against the entrance of evil. When on certain occasions the emblems of a shrine are removed from their places they are protected from evil influences by a straw rope around them. The custom of suspending a straw rope over doorways may be attributed to Susano. It is related that he was once overtaken by a storm and found shelter with a poor villager. In return for his kindness Susano told the villager how to protect himself and his family from a plague which was coming, by wearing a belt of twisted grass. He also taught him to guard against further visits of the plague god by stretching a straw rope across the entrance to his house.

The original sacred mirror made in heaven now rests in a box, wrapped in many folds of silk, in the principal shrine at Ise, a most precious emblem of the deity. The silk wrappings are never removed, but as they become worn new ones are added outside. This mirror has a flaw which was caused by striking it against a rock when it was held before the goddess. How it came to its present place we shall learn further on.

Counterparts of this mirror are to be found in nearly every Shinto shrine; but, contrary to the usual belief of travelers, the mirror is not always visible in Shinto temples. The sacred emblem, whether it be a mirror or something else, is always hidden from sight in the purest Shinto shrines.

THE SUSANO MYTH—THE SACRED SWORD OF ISE.

We must now follow the adventures of Susano. He was subsequently sent by Amaterasu to visit the goddess of Food.* She set before him some food, but he deemed it unclean, and, with his usual inconsiderate impetuosity, he forthwith cut off her head and reported the occurrence to Amaterasu. From the body of the deity grew various grains and seeds of every kind, mulberry-trees, and silkworms, and all these things were afterwards grown in the field of heaven, and from thence, in due time, transmitted to Japan.

Finally Susano was banished from heaven and took up his abode in Idzumo,† in the west of Japan. His adventure there with the great eight-headed serpent is known to every Japanese child. There was an old couple who had eight daughters, seven of whom had been devoured in succession by a serpent which had eight heads and eight tails, and whose body covered seven hills. They besought Susano to kill the monster lest it should take the last daughter, and he agreed to do so if he might afterwards make the daughter his wife. The parents consented, and he immediately transformed the daughter into a fine-tooth comb, which he stuck in his hair. He then directed them to prepare eight vats of liquor. When the serpent came it plunged a head into each vat and drank, then all the heads laid down and slept. Then Susano killed it, but when he tried to cut the middle tail his sword broke, and he found within the tail a great sword, which he carried to the Sun-goddess. This is the sacred sword of the Ise shrines. It was

*She is known as O-getsu-hime, Uke-mochi-no-kami, and Toyo-uke-hime. Her shrine is at Ise.

†There are families in Japan who trace their ancestry to Susano in Idzumo. This province is the part of Japan which seems to have been the earliest home of the Japanese. It is the scene of their ancient traditions and was perhaps their home until the famous Jimmu Tenno, in the seventh century B. C., began his march to Yamato, subduing savage deities and people on his way. The antiquarian would doubtless find many interesting relics in the ancient province, which offers an almost unopened field for exploration. My friend Mr. Gowland found there some of the finest and most remarkable tombs, quite different from any elsewhere known in Japan, but his time was too limited for extended observations.

conferred upon Ninigi when he came from heaven to govern the country, as we shall see further on.

The names "Grass cutter" and "Herb-quelling sword," which are often applied to this weapon, come from a later time when, in the reign of Keiko (A. D. 71–130), Yamato-take took the blade from Ise to use in subduing the savage tribes in the east and north. He was drawn into an ambush and his enemies set fire to the herbage on all sides of him. He mowed away the grass—or, it is said, the blade leaped from the scabbard and itself cut the grass around—and started a counter fire which saved his life.

HEAVENLY PRINCES SENT TO SUBDUE TERRESTRIAL DEITIES.

The record now tells of a great number of deities who were necessary to care for the world and make it fruitful, but most of them can be passed without mention.

After a time there began to be trouble in Japan because of the numerous savage terrestrial deities, and a consultation was held in heaven to determine who should be sent down to govern the world. O-kuni-nushi was then the Deity-master-of-the-great-land, and a very powerful ruler he was. A prince was sent down to control him, but he made friends instead and failed to make any report. A second was sent, but he married one of the princesses and strove to gain possession of the land himself. A third came down in the form of a pheasant and perched in a cassia tree, where he began to talk. The princess hearing the words, besought her husband to kill the bird, which he did with his heavenly arrow. But the arrow ascended to heaven where it was recognized as belonging to the faithless prince. Then one of the deities thrust it back through the hole by which it entered heaven, saying: "If this arrow be shot by the prince in obedience to our commands, let it not hit him. If he has a foul heart let him perish by this arrow." So the arrow struck the prince and killed him.

Finally the powerful O-kuni-nushi was subdued, but as a condition of his submission he required a temple to be built for him in Idzumo, where he might receive proper services of worship, the pillars of which should reach from the nethermost rock bottom to the cross-beams in the plain of high heaven. O-kuni-nushi became the ruler of Hades, and as such is worshiped and propitiated. The temple built for him in Idzumo is the famous O-yashiro, well known to pilgrims in that land.

THE MIKADO'S DIVINE ANCESTORS.

The grandson of the Sun-goddess then descended to rule in Japan. His name was Ninigi-no-mikoto. With him descended a numerous company, and from him and his train the imperial family and the Japanese people trace their ancestry and base their claim to a divine origin. Ninigi bore, as the insignia of heavenly authority, the mirror which had

allured the Sun-goddess from her cave, the string of sacred jewels, and the sword found by Susano in the serpent's tail. The Sun-goddess charged him thus: "Regard this mirror exactly as if it were our august spirit, and reverence it as if reverencing us." Transubstantiation is an older idea among Japanese than among our own priests.

THE FIRST MIKADO.

A pleasing story follows about the beautiful Princess-blossoming-brilliantly-like-the-flowers-of-the-trees, who bore three sons named Fire-shine, Fire-climax and Fire-subside. The first lost his brother's fish-hook in the sea and though he made five hundred others to replace it, his brother would not be satisfied. So Fire-subside sailed in a boat to a palace built of fish scales, the abode of an ocean deity, and there fell in love with the Sea-god's daughter. After three years he told the story of the fishhook. The Sea-god called together all the fishes of the sea and the hook was found in the throat of a *tai*. The Prince was sent home on the back of a crocodile, and gave the hook to his brother. The Princess, his wife, bore him a son named His-Augustness-Heaven's-sure-height-prince-wave-limit-brave-cormorant-thatch-meeting-incompletely. This son with an unusual name married his maternal aunt and begot children, one of whom was His-Augustness-Divine-Yamato-Prince, who is the recognized first Mikado, better known by his posthumous title Jimmu Tenno, whose reign is reputed to have been from B. C. 660 to B. C. 585, when he died at the age of 127 years.

From this point on the Kojiki is a record of the emperors down to the time of Suiko (A. D. 593 to 628). For a thousand years, to the time of Richiu (A. D. 400), the chronology is quite as uncertain as the events recorded. In the earliest times numerous terrestrial deities ruled the country, who either freely submitted to the emperors or were compelled to do so. We read that as Jimmu Tenno advanced to subdue the barbarian tribes in the north and east, the Earth-spiders, with tails, and the savages called Ebisu,* supposed to be the Ainos, he was guided across the waters of the Inland Sea (!) by a friendly deity riding on a tortoise, and, as the bad deities were still numerous on the land, a great crow was sent from heaven to lead him.

SHINTO AS A RELIGION.

I have thus endeavored to present in an intelligible and connected form the salient features of the mythology of Shinto. It has been no light task to worry through the details of it as found in the Kojiki and other books and make a readable story. Fantastic as it all is, there is still a thread of connection from the beginning which enforces the

* For a résumé of our knowledge of these people, see the author's memoirs on The Ainos of Yezo and on The Pit-Dwellers of Yezo. Report of U. S. National Museum, 1890.

conviction that it is not an idle invention of the fancy, but rather a product of slow development. We can not go far enough back in time to discover its origin. From the very first we find a long line of specialized kami. There is very little in it that can be traced to other lands, and that little not very confidently. It is Japanese in its inception and has remained so. We may imagine that it is an outgrowth of some primitive form of sun worship, for the sun is still adored as the source of light and life—the great ancestor of the emperor and people. Afterwards the phenomena of nature came to be represented by kami, and the original functions and attributes of these have become changed and forgotten.

Ancestral worship is one of its great features. The spirits of the dead are believed to live about their tombs or in temples built for them. They are Kami, dwelling in the unseen world around us, with power to influence the fortunes and destiny of the living. The object of all worship is to insure protection from evil and success in the affairs of the present. Future rewards and punishments are not offered to make men good. The ruler of the under world has it in his power to make the entering spirits more or less uncomfortable, and he should therefore be propitiated by prayers and offerings, to secure his favor.

But there certainly is a future life, although it has been denied by some, who think that because there is no dread torture chamber for the wicked or land of eternal happiness for the good, there can be no thought of a future. But the Shintoist has no fear of death. To him "Life has no more consistency than a dream, and no trace of it remains." The future life is totally distinct from the present and a Japanese is not good because he fears eternal fire and torment. Evil and good are both clearly recognized. One of the great annual ceremonies is that of purification. If there is no written code of morals, a Japanese writer defends his faith by saying that "only immoral people like the Chinese require a system of moral teaching." Every event is attributed to an act of the gods. If anything goes wrong in the world, if the wicked prosper and the good suffer misfortune, it is because the evil gods are sometimes too strong for Amaterasu to restrain them. "The Chinese were ignorant of this fact and were driven to invent the theory of heaven's decrees."

The Japanese child learns the Irova as our own children do the alphabet, and these are the thoughts instilled by their earliest teaching and which are ever before them in after life:

> Color and odor alike pass away.
> In our world nothing is permanent.
> The present day has disappeared in the profound abyss of nothingness.
> It was but the pale image of a dream; it causes us not the least regret.

The traveler in Japan is often astonished to find houses of pleasure lining the principal thoroughfares leading to the great temples. It is scandalous to observe how carnal pleasures are associated with religious worship. But as there are bad deities to be propitiated, these houses

and theaters and dancing stages entertain them well and, moreover, the good deities are pleased when the people are happy.

In the early days of foreign intercourse, when the Dutch were confined at Nagasaki, and every means was taken to prevent them from learning about the people and the country, the indefatigable Kæmpfer was able to gain some insight into their religious beliefs. His account is as follows: "The more immediate end which the followers of this religion propose to themselves is a state of happiness in this world. They have indeed some, though but obscure and imperfect, notions of the immortality of our souls, and a future state of bliss or misery; and yet as little mindful they are of what will become of them in that future state, so great is their care and attention to worship those gods, whom they believe to have a peculiar share in the government and management of this world, with a more immediate influence, each according to his functions, over the occurrences and necessities of human life—and although they acknowledge a Supreme Being, which, as they believe, dwells in the highest of Heaven, and though they likewise admit of some inferior gods whom they place among the stars, yet they do not worship and adore them, nor have they any festival days sacred to them, thinking that beings which are so much above us will little concern themselves about our affairs."

This is a remarkably correct summary by a man who could not have known anything about the mythology itself. The "Supreme Being" is the Sun-goddess, but it is strange that in a system dealing so largely with the sun and moon the stars should not be conspicuously mentioned.

The department of religion thus summed up the requirements of the Shinto faith in 1872:*

1. Thou shalt honor the gods and love thy country.
2. Thou shalt clearly understand the principles of heaven and the duty of man.
3. Thou shalt revere the Mikadot as thy sovereign and obey the will of his court.

INFLUENCE OF SHINTO UPON THE NATIONAL CHARACTER.

The religion of a people dominates their thoughts. This fact too frequently leads to a totally erroneous interpretation. It is the thoughts, fears, beliefs and dreams of a people which have made their religion. This, when formed into a system, either by natural growth or by the labor of an organized priesthood, becomes an expression of the religious thoughts and feelings at the time—otherwise a system so formed would be rejected by the people. Once accepted it becomes the dominating

* Griffis: The Mikado's Empire.

† Implicit obedience to the Mikado is required. It is admitted that he may not always be good, but as his real character is that of a god, his authority is never to be disputed. It is a remarkable fact that never during the history of Japan have the people knowingly rebelled against or opposed the will of the Mikado. They have been misled at times by designing leaders, but in intent they have ever been faithful. The possession of the Mikado's person has always been a source of strength to either of the contending forces.

influence and because religious thought is always narrow and conservative, it is usually much behind the intelligence of its adherents, although retaining its influence and authority.

With this understanding clearly before us it may be asked if the Japanese people believe this wonderful record of the origin of themselves and their country and how much it has influenced their character as a nation. Do our own people believe the book of Genesis, or the text of their own scriptures? How long does it take for a faith that has grown during centuries to die away? The idea that the Japanese are a people who have so assimilated and digested foreign knowledge as to be able to think as we do is most erroneous. There are many educated Japanese who believe, or still pretend to believe, in the divine descent of the Mikado, and who accept the national chronology from Jimmu Tenno down. But after all, this is no more absurd than many beliefs of our own good people, and we must not forget that we too have houses of glass. It is scarcely a quarter of a century since the following words were published by the Mikado; "I am concerned standing as I do, between Tensho-Daijin (Amaterasu) and my people." "My house, that from Jimmu Tenno on to the present day has ruled over Dai Nippon (Great Japan), according to the will of the gods." His is thus the oldest dynasty on earth, his family having ruled Japan for 2,550 years, tracing its ancestry for still 10,000 years back, to the creation of the world.

It is an old notion of the Japanese that they are superior to all other nations and a strange chapter might be written upon the consequences past and present of that belief. It is so essentially a part of Japanese character that it cannot be immediately outgrown. At the basis of it lies the Shinto faith. How true this is, and how firmly grounded the conceit is may be learned from the native writings in defence of Shinto. The subject is of interest as showing to what an extent the Japanese character conforms to the spirit of the ancient teachings, and it becomes of the greatest importance that we should understand it well in our political and social intercourse with the Japanese. They have a well-known story of Wasaubivauwe. which points a moral they would do well to heed.

The utmost efforts of the Shinto writers have been put forth to belittle Japan's indebtedness to China for letters and philosophy. The following quotations are given without regard to authority or chronological order, but the latest date from early in this century. A doubting critic asserts that there must have been total darkness before the sun was born, a fact inconsistent with the statement that plants already existed at the time. The answer is worthy of certain logicians of our own time and country: "Although she (the sun) will continue to shine as long as heaven and earth endure, she was born in Japan, and her descendants rule over the empire to this day. The difficulty of reconciling the statements that the world was plunged into darkness

when she retired into a cavern and that darkness did not exist before she was born, is one that would strike a child's intelligence. The critic need not make so much fuss about this point, as if it were an entirely new discovery of his own. The very inconsistency is the proof of the authenticity of the record, for who would have gone out of his way to invent a story apparently so ridiculous and incredible. The acts of the gods are not explained by ordinary principles." (Translation of E. Satow.)

China suffers rather severely at the hands of the Japanese critics. One of them thus disposes of a very ancient tradition: "There is a tradition in China that the left and right eyes of Puanku became the sun and the moon, which is, however, usually discredited, because the natives of that country, being admirers of false knowledge, assign the origin of these two luminaries to the positive and negative essences. The real truth is, that the sun and the moon were produced when Izanagi washed his eyes after returning from his search after Izanami in the nether world. The tradition has evidently traveled to China and assumed the perverted form in which we find it there." (Satow.) What infinite assurance! The story was current in China before the Japanese began to exist as a nation. But this is only an introduction. We add more quotations without further remarks.

"People who have been misled by their foreign studies are wont to say that Japan is a little country, as if extent of territory were any criterion of the importance or rank of a state."

"From the fact of the divine descent of the Japanese people proceeds their immeasurable superiority to the natives of other countries in courage and intelligence."

"It was not out of vainglory that the inhabitants of this country called it the land of the gods. The gods who created all countries belonged to the Divine Age and were all born in Japan, so that Japan is their native country and all the world acknowledges the appropriateness of the title. The Koreans were the first to become acquainted with this truth," etc.

"As it was Japan which lay directly opposite the sun when it separated from the earth, it is quite clear that Japan lies on the summit of the globe."

"Foreign countries were of course produced by the power of the creator gods, but they were not begotten by Izanagi and Izanami, nor did they give birth to the goddess of the sun, which is the cause of their inferiority. The traditions about the origin of the world which are presented in foreign countries are naturally incorrect, just as the accounts of an event which has happened at the capital become distorted when they travel to a province and it comes to be believed that the province was the scene of the event." (Satow.)

LITURGIES AND FORM OF WORSHIP.

The services at the temples consist in the repetition of prayers and rituals of prescribed form, with prostrations and presentation of offerings. The pure Shinto ceremonial is now but rarely seen, and only at two or three famous shrines. In the old time there was no priesthood, but the principal duty of the Mikado was the celebration of the rites. In the seventh century the Emperor Kotoku said to his minister, "First serve the gods, afterwards consider matters of government." The Mikado was the chief priest, and the person who at a later date read the liturgies at the capital was a descendant of one of the deities who came from heaven with Ninigi. The priestly office is still hereditary in the same family or tribe named Nakatomi.*

The officers in charge of Shinto shrines wear ordinary clothing, over which when they officiate they throw a priestly robe of white.

Shinto seems to have been a well-organized religious system at an early day. The book of ceremonial law, published in the year 927, contains much relating to the Shinto worship, including the ceremonies for special occasions, organization of the priesthood, services at the Ise temples, a list of temples entitled to government support, and the chief *norito* or rituals. This book was several times reprinted—the last time in 1723—by order of the Government. Among the liturgies it contains Mr. Satow enumerates the following:

Service of the praying for harvest.
Service of the goddess of food.
Service of the goddess of wind.
Service of the temple of Inaki.
General purification on the last day of the sixth month.
Harvest festival.
Service of the temples of Ise.

The offerings to be made at the shrines are also prescribed. In the old time the praying for harvest was celebrated on the fourth day of the second month. The ministers of state, officers of the Shinto religion, the priests and priestesses of the temples maintained by the Mikado, assembled at the office for the worship of the Shinto gods, while throughout the country the chiefs of the local administrations and governors of provinces led the worship at other shrines. The articles offered included silk and hemp cloth, models of swords, a spear-head, a shield, bow and quiver, edible seaweed, salt, saké, and to each of the temples at Ise a horse for the god to ride, a cock to tell the time and a domesticated boar for food. In ancient times curved jewels or beads (magatama) were offered.

* Up to the year 1868 the nominal prime minister of the Mikado belonged to this family, which in the seventh century changed its name to Fujiwara, famous in Japanese history.

An abstract from one of the rituals, taken from Mr. Satow's translations, will sufficiently indicate their style and character:

"I declare in the presence of the sovran gods of the harvest. If the sovran gods will bestow in many bundled ears and in luxuriant ears the late ripening harvest which they will bestow, the late ripening harvest which will be produced by the dripping of foam from the arms,* . . . then I will fulfill their praises by setting up the first fruits in a thousand ears, . . . raising high the beer-jars, filling and ranging in rows the bellies of the beer-jars, I will present them† in juice and in ear."

Following this come further declarations and promises of offerings to numerous Kami, whose names are recited as Divine Producer, Fulfilling Producer, Lofty Producer, Vivifying Producer, Great Goddess of Food and others, because these grant a "luxuriant age." The ritual is of universal application and is used when the Mikado makes his offerings to the great shrines of the national Kami.

Besides the liturgies we find prayers, as this: "I say with awe, deign to bless me by correcting the unwitting faults which, seen and heard by you, I have committed, by blowing off and clearing away the calamities which evil gods might inflict, by causing me to live long like the hard and lasting rock, and by repeating to the gods of heavenly origin and the gods of earthly origin the petitions which I present every day, along with your breath, that they may hear with the sharp-earedness of the forth-galloping colt." (Satow.)

This prayer is addressed to the gods of wind at Tatsuta, in Yamato. There is in it a confession of sinfulness and the idea of divine intercession, the petition being at least borne on the winds, the breath of the deities, to more distant Kami.

Home worship is conducted before a simple household shrine known as the *kami-dana*. The deities are too numerous to be all mentioned. It is only necessary to name the principal ones and to address the others in a general prayer; or one may simply adore the residence of the Mikado, the kami-dana, the spirits of ancestors, the local patron god and the deity presiding over one's calling in life.

The ancient sun worship can be witnessed at the hour of sunrise throughout Japan in the streets, in the doorways, on bridges and in the fields. Once I was at Ise and I walked, with a thousand pilgrims, to witness a glorious sunrise over the sea and the famous rocks at Futaga-ura. There they gather every morning and greet the nation's god, at a spot famed in native art and story and there they find an inspiration in the scene, which appeals to the Japanese innate sense of the beautiful in nature, if not to a deep religious sentiment, which perhaps they do not possess.

* Referring to the dripping from the arms of the laborers in setting out the rice plants in flooded fields.

† The first fruits.

TENDENCY OF RELIGIOUS THOUGHT IN JAPAN.

If the forms and ceremonies of worship among heathen peoples, and among the illiterate in our own land, are not an exaggerated indication of the reverence and religious sentiment of the worshipers, we can well understand how religions have ever exercised a controlling influence upon mankind. But in Japan the religious sentiment has not been strong. The people may believe in the efficacy of prayer and they are quite as devout in the formal observances of their religion as need be to insure prosperity and long life. They make long pilgrimages to famous shrines and offer daily prayers before ancestral tablets. But there is not much feeling or sentiment about such worship.

Christianity is supposed to be making its way, but it can never gain a strong footing in either Japan or China. The statistics of converts given by the missionaries are entirely misleading. Christianity is not adapted to the Japanese character. Its gruesome teachings of a jealous God ruling supreme over the destinies of man, whose justice is without mercy, involving a hell and eternal torment, will never be received by them. The new teaching is having some influence, although not what is intended by its ministers. It is destroying the last vestiges of faith in the religion of the country and offering nothing acceptable in return. The consequence is, that the Japanese are becoming, through the misdirected zeal of Christian missionaries, sustained by the widow's mites and children's pennies from home Sunday schools, a nation of independent, liberal thinkers on religious subjects. It is the nature of man, however, to have some form of religion; therefore, it is not improbable that eventually the Japanese will evolve, out of the elements of their own mythology, the teachings of Confucius, Buddha and Christ, a new faith which will prove acceptable to the people. They may go even further than this and by adopting the teachings of Christ, shorn of the theological travesties of modern Christianity, give to the world a new religion worthy of the age. I believe them capable of accomplishing such a work.

No account of the religion of Japan can be complete without a description of the temples which are scattered in great numbers over the land, but owing to the length of this article already and also to the fact that the author is too far from home to select and arrange the illustrations necessary to a proper understanding of temple architecture, it is deemed best to defer this part of the subject until his return home.

TIENTSIN, CHINA, 1891.

THE ANCIENT BURIAL MOUNDS OF JAPAN.

By ROMYN HITCHCOCK.

would appear that when the famous Jimmu Tennō, the divinely
ended first Emperor of Japan, the child of the sun and the ancestor
ıe present reigning dynasty, began his journey through the land,
net with two kinds of inhabitants. There was a race of Tsuchi
ıo, described as people with tails, who lived in underground burrows
ıves. I have elsewhere endeavored to show that there probably was,
ıct, a race of pit dwellers who disappeared toward the North, leav-
traces of their existence in the pits of Yezo.* In addition to these,
e was a race of "hairy savages" which we have no difficulty in
ıtifying as the Ainos,† who are known to have formerly lived in
hern Japan.

have only alluded to these two peoples in order to remove any pos-
e question which might arise as to the Japanese origin of the tombs
hich I am to speak. Although many of them are very ancient, they
certainly Japanese. This we know partly from tradition, but more
ainly from the articles interred with the dead. Had they a pre-
anese origin, we would expect to find within them vessels of pottery
more ancient pattern, such as the predecessors of the Japanese left
nd them in the shell mounds.

ne of the earliest modes of burial in Japan was in artificial caves,
n out of the solid rock on hillsides. It has been said that the early
ınese lived in caves. This is very doubtful, for although there are
ıral caves in certain parts of the country, they are not found where
history of the people begins, in Idzumo and Yamato.

evertheless, the idea of cave life was familiar to the Japanese, for
legend of the Sun goddess who entered a cave and closed the en-
ce with a stone, leaving heaven and earth in darkness, is a very
y and important myth.‡ It is also said, that in the reign of Jimmu

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he Pit Dwellers of Yezo, by Romyn Hitchcock. Report U. S. Nat. Mus., 1890.
7.

he Ainos of Yezo, by Romyn Hitchcock. Report U. S. Nat. Mus., 1890, p. 429.

hinto, or the Mythology of the Japanese, by Romyn Hitchcock, Report U. S.
Mus., 1891, p. 489.

Tennō "the inhabitants were still plunged in barbarism and mostly lived in caverns." (Klaproth.)

Prof. Milne has brought together many allusions to the early cave dwellings* of Japan taken from native writers, but all of these may as readily have reference to the aborigines as to the Japanese themselves, and it seems to me with greater probability.

The Chinese character which is translated "cave" means "apartment," or "a cave or pit dug into the earth." It is uncertain what kind of dwellings or caves are thus designated. Some chambers were built with stones and may have been the dolmens which will soon be described; others were made of turf and recall the dwellings of the Kuriles. While much of this uncertainty is due to the use of an ambiguous Chinese character in writing, the examination of the true caves, natural and artificial, in dicates that if ever the Japanese were cave-dwellers it was before they migrated to Japan.

The observations here brought together are the result of considerable travel and intimate association with Mr. W. Gowland, formerly chemist of the Imperial mint at Osaka. Mr. Gowland has spent several years in the study of the Japanese mounds, and he is the only person who possesses sufficient accurate and valuable information upon the subject to prepare a comprehensive monograph. It is to be hoped that the results of his years of labor and observation will be published. His fine collection of relics from the tombs, now in the British Museum, is unique and of great value. It can never be duplicated. Many a day we have tramped together on the rough mountain sides, searching for tombs or sepulchral caves, and at evening compared notes and recounted experiences in Japanese hotels. I recall the cozy comfort of those neat matted floors, the bronze *hibachi* with its steaming kettle, the savory and unsavory dinners, both varieties of which are furnished in Yamato, and many other incidents familiar to the traveler in the interior of Japan.

Several distinct methods of burial have prevailed in Japan at different periods. These may be distinguished as follows:

(1) Burial in artificial caves.
(2) Burial in simple mounds of earth.
(3) Burial in mounds with rock chambers or dolmens.
(4) Burial in double mounds or imperial tumuli.

The chronological sequence of these different modes of burial is largely a matter of speculation. Among the earliest was interment in artificial rock caves. Such caves are quite numerous in various provinces. In Pl. XXXIII we have a view of four such caves in Kawachi. The fronts are crumbling away and we look directly upon what were originally the dark interiors. The largest of this group shows the remains of a stone coffin cut from the rock *in situ*. Originally the caves were entered through small apertures, which were doubtless at one time closed

* Trans. Asiatic Soc. of Japan, VIII.

CAVES IN KAWACHI.

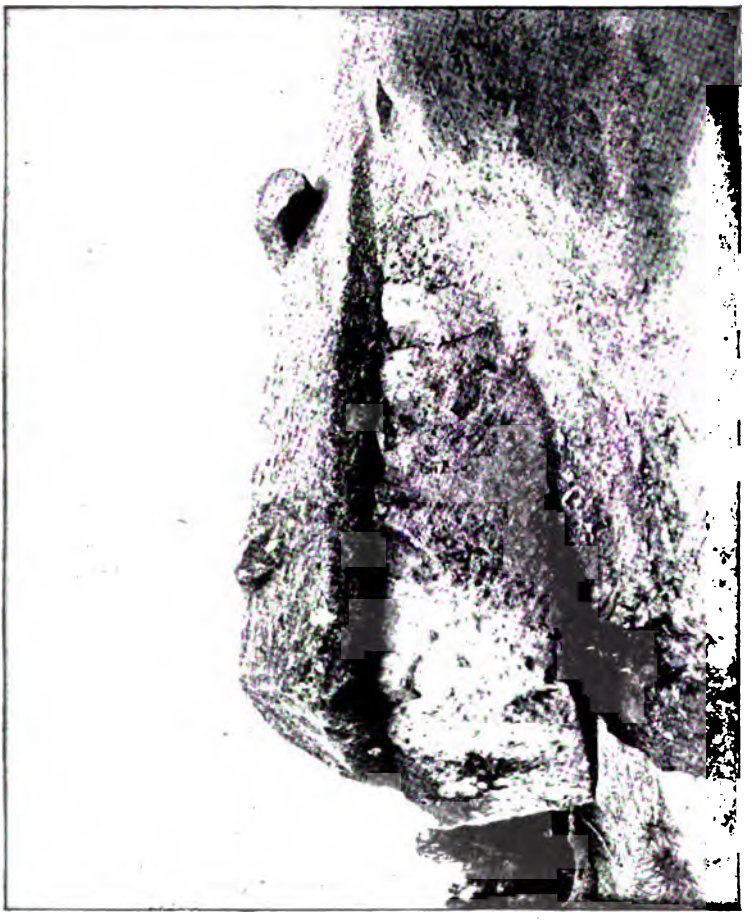
ith stones. Probably all were provided with either stone or clay offins, but now only fragments of these remain. Pl. XXXIV shows the mains of the coffin just referred to. Usually the coffins are placed at ie back of the caves, raised on a shelf a few inches from the floor.

The caves vary greatly in size, but they never reach very large proortions. Perhaps they average 5 feet in height and 6 to 10 feet quare. They contain no remains whatever except the fragments of offins. If they ever did enclose articles of pottery or treasure interred ith the dead, the vandalism of the peasants has robbed every one of hem. I have crawled on hands and knees into many of these gloomy ecesses, inhabited by bats which fly unpleasantly near one's face, and earched by the light of a candle for what might be found, but with no rther reward. I well remember one occasion when Mr. Gowland and were long entombed in the close, damp atmosphere of a cave, not far om Kokubu. We proposed to photograph the interior with the flashght. To place our two cameras at the mouth of the cave required veral hours of hard digging with hammer and knife, and the contorons required in focusing were too wonderful for description. We cused on a burning candle held at different points to outline the field f view. Finally the light flashed; and if the spirit of the departed ncient still hovered around its tomb, as the people believe, and if it ad progressed far enough in the transcendant thought of the western orld to grasp the fantastic idea of a bodily rising from the dust, I ink it must have believed the resurrection day had come.

The most we can say of the caves is, that they are numerous in some ctions, that they were used only for burial, and that probably they eceded in time the rock-built dolmens. No date can be assigned to em. There is not a vestige of a skeleton, not a line of inscription, thing but the soft, half-decomposed rock remaining, to bear witness the veneration bestowed upon the dead in ages past. The great estion presented now for the ethnologist to solve concerns the origin the custom of cave-burial among the Japanese.

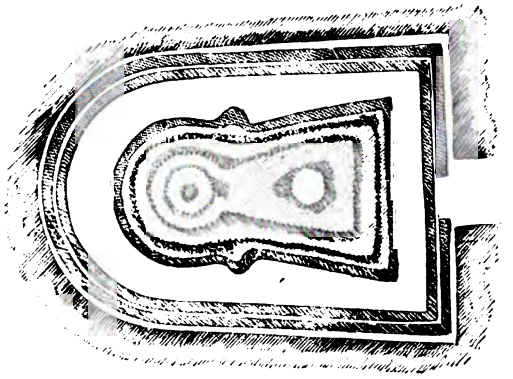
The God Take-mika-dzuchi was famous for his desperate combats th demons. On the island of Kashima there is a mound known as *i-dzuka*—demon mound. It is said that the God killed a devil there d buried him, heaping the earth above him. This was before the ne of Jimmu Tennō. Such a mound doubtless represents the earliest rm of burial among the Japanese.* Examples of such simple mounds, eraging about 4 to 8 feet in height, are numerous in the country. ch is the character of the traditional mound of the first emperor, ting from the seventh century B. C.

* H. Von Siebold has described a small mound 8 feet in height and about 20 feet circumference, without any coffin, in which six coins were found, two of which re recognized, the first as from the time of Shofu Gempo, 1004 B. C., the second Seiso Gempo, 961 B. C. The importance of this find is easily overestimated, and annot be regarded as very significant of the age of the mounds.



STONE COFFIN *in situ*, DOMIOJI.

1



2

1. A DOUBLE MOUND. (From a Japanese sketch.)
2. GROUND PLAN OF A DOUBLE MOUND. (From a Japanese sketch.)

3

4

3. TERRACED MOUND, SEVENTH CENTURY. (From a Japanese sketch.)
4. CYLINDER. (From a Japanese sketch.)

TUMULUS OF NINTOKU TENNŌ.

between them. The mounds are entirely surrounded by deep moats filled with water.

It is unfortunate that these tumuli are being improved and beautified by the general Government, for their original character is thereby changed beyond recognition. We have a good illustration of this fact in the mound last mentioned. A few years since (in 1882) it was surrounded by an old wooden fence, octagonal in form, measuring about 33 paces across the southern end. Now the inclosure is square and very much larger. The archæologist may well deplore the activity of the Japanese in this direction, for these old tumuli of Mikados of the mythical age are being so changed that their primitive character and shape are forever lost. White stone fences, carved stone lanterns and torii, and graveled walks have no association with the strict simplicity of the past. Nothing can justify to an ethnologist such alterations as have already been carried out in Yamato.

Pl. XXXVII is copied from Japanese drawings. For these, and for others of the same character, I am indebted to the courtesy of Mr. K. Yamanouchi, secretary of the imperial household department. The first drawing on the left purports to represent the earliest form of double mound. Here we see the wide moat and two distinct elevations with a depression between them. The deep depression is the result of weathering and was not a part of the original design. The south end is straight, the north end rounded. The interment was at the top of the northern elevation.

The ground plan is more clearly shown in the lower drawing. The sides are constricted to correspond with the depression at the top. The two lateral projections are not often seen. The sides of the mound are terraced as represented. This terraced structure will soon receive closer attention. The interment was in the center of the smallest circle, at the top of the rounded end. This form of mound is ascribed by the Japanese to the period from Jimmu Tennō to 640 A. D. As this period embraced about twelve centuries it may be accepted as probably correct.

The original form of the double mound is only to be made out by the careful examination of numerous examples, for nearly all have become greatly changed by weathering. The tumulus of Nintoku Tennō, near Sakai, is represented in Pl. XXXVIII as seen from the southeast. In this picture may be seen the straight southern end of the mound, the exaggerated depression at the top, and the constricted side. The wide and deep moat is only an inner moat, for this mound is doubly protected. This mound, according to Japanese reckoning, dates from about the fourth century. The height of this tumulus is about 100 feet and the circuit of the base 1,526 yards.

The tumulus of Keitai Tennō is a very large mound, a landmark for miles around in the rich, flat valley of the Yodo, not far from Ibaraki. On the signboard is an inscription which was translated for me as follows: "Kei-tai Tennō mishima misasagi. Distance around, 519 ken 6

bu. No one permitted to go inside. No fishing or shooting allowed." The absurdity of this official declaration of the size is obvious when we consider that it is the same as stating the distance around an irregular mound to tenths of an inch. The figures would be about 3,114 feet and 0.6 of an inch. The Emperor Keitai is reputed to have lived in the sixth century. He was one of the last Emperors known to have been buried in a double mound.

Near Nara there are two mounds known as Onabe and Konabe. The former was quite carefully measured by Mr. Gowland and myself. The length north and south was found to be 485 feet along the top, the length at the base being considerably more. The top of the southern end is 78 feet wide. The northern or burial end rises 20 feet above the depression in the top.

The other mound, Konabe (Pl. XXXIX), is here shown as seen from Onabe. Here again is shown the straight southern end and a portion of the moat. This mound is in pretty good preservation, and the contour line of the top does not descend much below the height of the southern end.

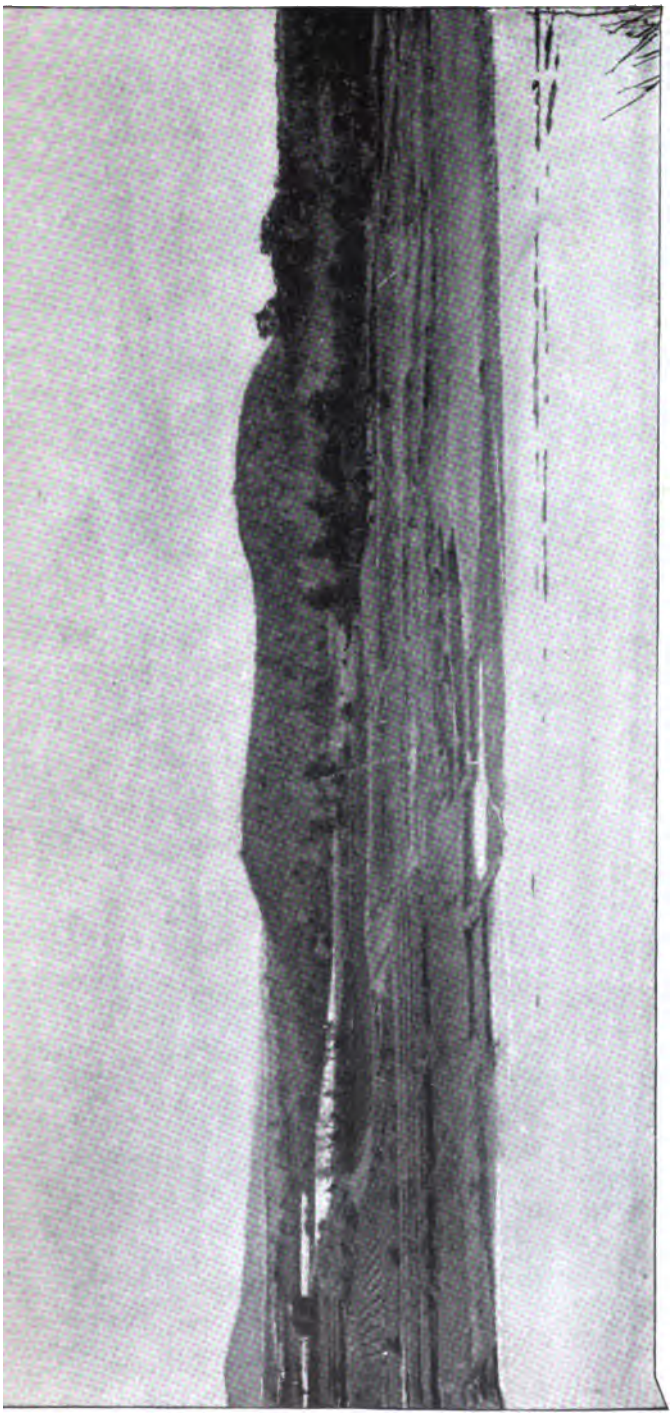
A distant view of the mound of Ojin Tennō, in Kawachi, shows well the original shape of the double mounds. The depression between the two ends is very slight, the northern end being somewhat higher than the southern, the contour line between them descending gently from the former and rising a very little to the latter. A nearer view of the same mound (Pl. XL) shows the depression exaggerated, owing to an unfavorable point of sight. But in this picture we have another conspicuous feature of all the recognized imperial tombs, a plain wooden inclosure with a gateway, painted white, situated on the outer border of the moat opposite the middle of the south end of the mound. This picture also gives an idea of the great size of the mounds, by comparison with the man in the field.

The wooden gateway is again shown in Pl. XLI. It is always closed. The design calls to mind the gateways at the Ise shrines, the ancient form of *torii* not often seen elsewhere.

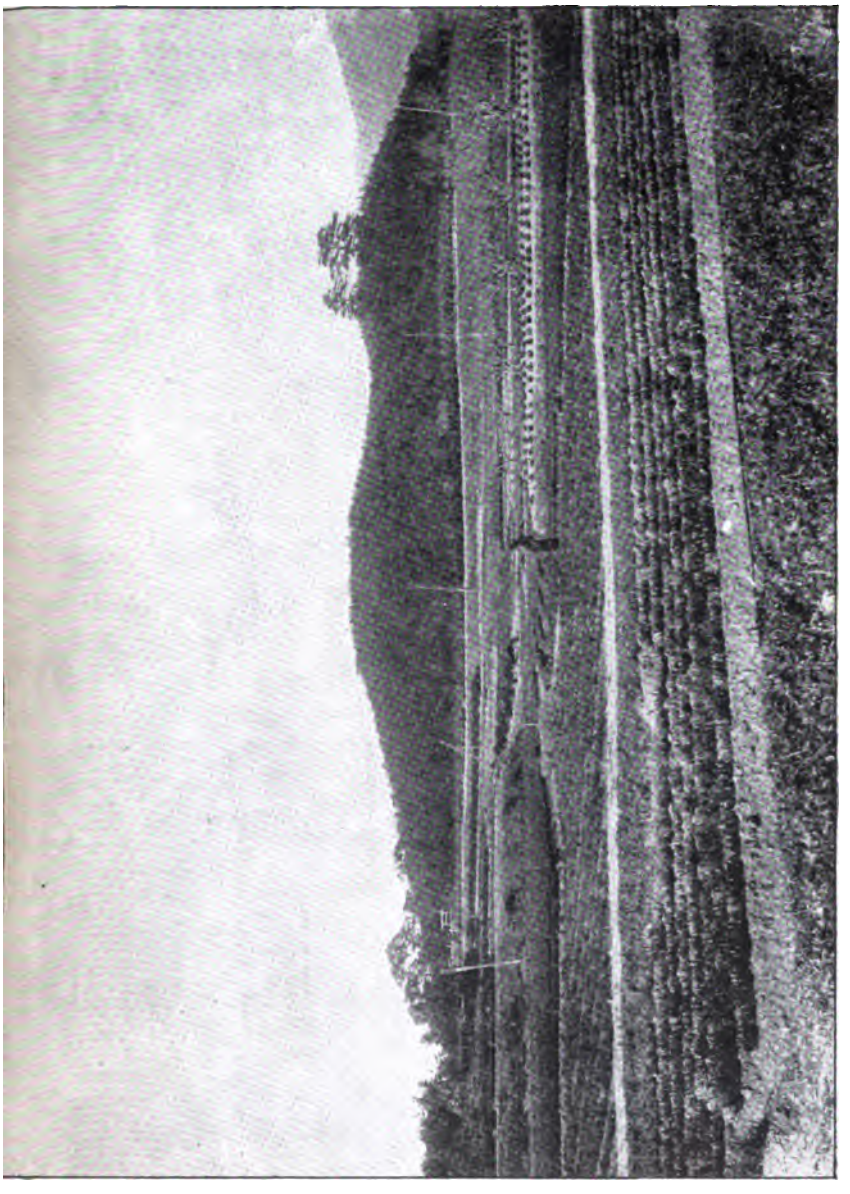
Mr. E. Satow has described two mounds in Kodzuke, one of which is shown in Pl. XLII as represented in his drawing. In shape it is a double mound, but it has a chamber with an entrance at the side and in this respect it differs from all the mounds I have seen. This mound is 36 feet in height, 372 feet long, and 284 wide. The chamber is entered through a passage 33 feet in length. There are two chambers, separated by a low sill of stone, the outer 24 feet in length, the inner 6 feet, the height being about 6 feet. Mr. Satow concludes that these mounds date from about 50 B. C., but this is very uncertain.

In the year 646 the size of tombs which persons of different ranks might build was specifically stated. "A prince might be buried in a vault 9 feet long and 5 feet wide within, covered by a mound 72 feet square and 40 feet high. A thousand laborers might be employed in

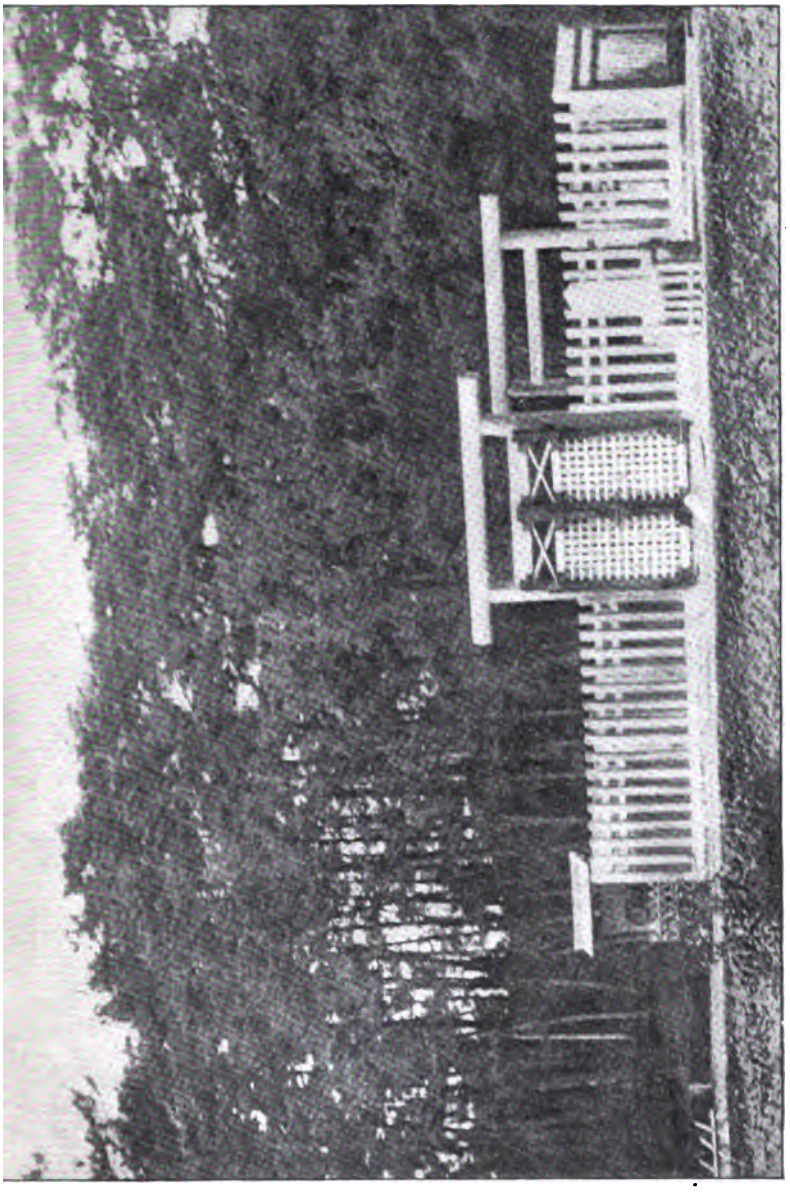
PLATE XXXIX.



TUMULUS NEAR NARA-KONABE.

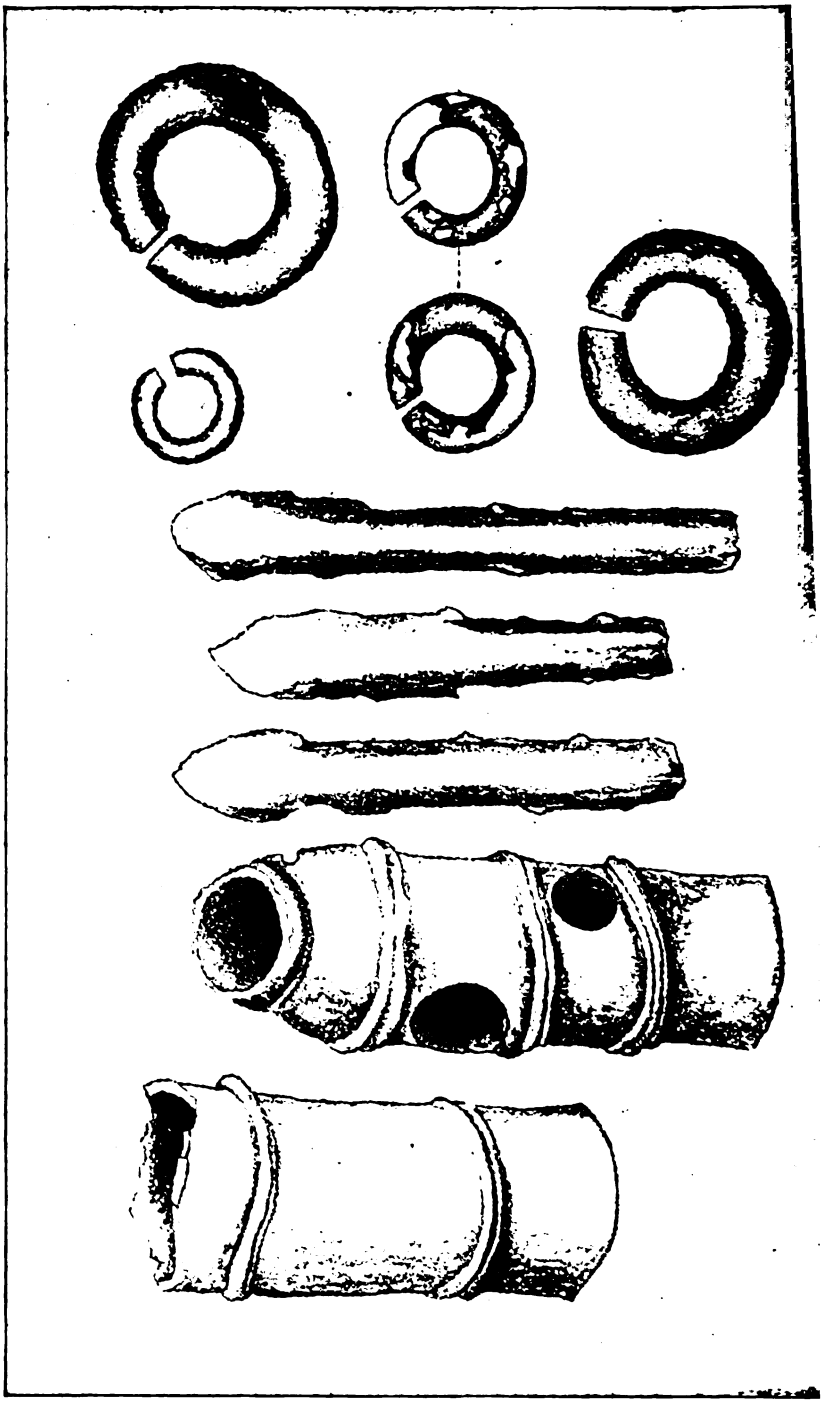


TUMULUS OF OJIN TENNO.



GATE OF TUMULUS.

MOUND IN KODZUKE. (FROM SATOW.)



the construction, and the work was to be completed in seven days. A vault for a functionary of the highest rank was to be of the same dimensions, but the mound was to be only 56 feet square and 22 feet high, while only half the number of laborers was allowed." (Satow.)

Reference has been made to the terraced character of these mounds. This structure is shown in a Japanese drawing of a mound of a later date than that ascribed to the double mounds, reproduced in the upper right-hand figure of Pl. XXXVII. This form of mound is said to date from about the seventh century. It is a single mound.

This terraced structure is exceedingly interesting because of the remarkable method adopted to protect the terraces from being washed away by the heavy rains of spring and early summer. Along the borders of the moat and around the edge of each terrace, also planted in circles at the top of the mound, around the place of interment, there have been discovered rows of closely placed cylinders of clay of peculiar form. These are hollow cylinders, very roughly made, with one or more lateral apertures.

One of these cylinders is well represented in Pl. XXXVII, copied from a Japanese drawing. This one measured: Height, 16 inches; greatest circumference, 22 inches. The top is constricted, and this feature will be referred to further on. Another one measured as follows: Height, 10 inches; circumference at base, about 30 inches; circumference at top, about 24 inches.

A slightly different form, in which the lateral apertures are placed at right angles to each other and at different heights, is figured by Mr. Satow from the mounds in Kodzuke, concerning which he says: "The mounds were built up in three tiers [terraces]. On the top of each tier was a fence formed of terra-cotta pipes about 2 feet high, connected by wooden poles or bamboos passed through holes about half way from the base." Mr. Satow's tubes measured 11½ to 14 inches in length by 4½ to 6 inches in diameter. Pl. XLIII, taken from Mr. Satow's article,* represents a cylinder with apertures at right angles. This cylinder with a constricted top Mr. Satow calls a "corner post," assuming that the holes were made for bamboo connections.

At a mound near Nara we found some of the cylinders exposed by weathering. Pl. XLIV shows how they occur *in situ* around the base of the mound. The cylinders are open at both ends and have three ribs. They vary considerably in size. One of fair average size measured as follows: Total height, 16¾ inches; height to top of upper rib, 15¾ inches; distance between upper and middle rib, 4⅜ inches; distance between middle and lower rib, 4½ inches; diameter, 12 to 14 inches; lateral aperture below middle rib, 1⅝ inches; diameter of lateral aperture, 2 inches.

The cylinders were undoubtedly introduced to prevent washing down of the terraces and the banks of the moats. They must have been made in enormous quantities. The use of the lateral aperture is not

* Trans. Asiatic Soc. Japan, VIII (1880), 322.

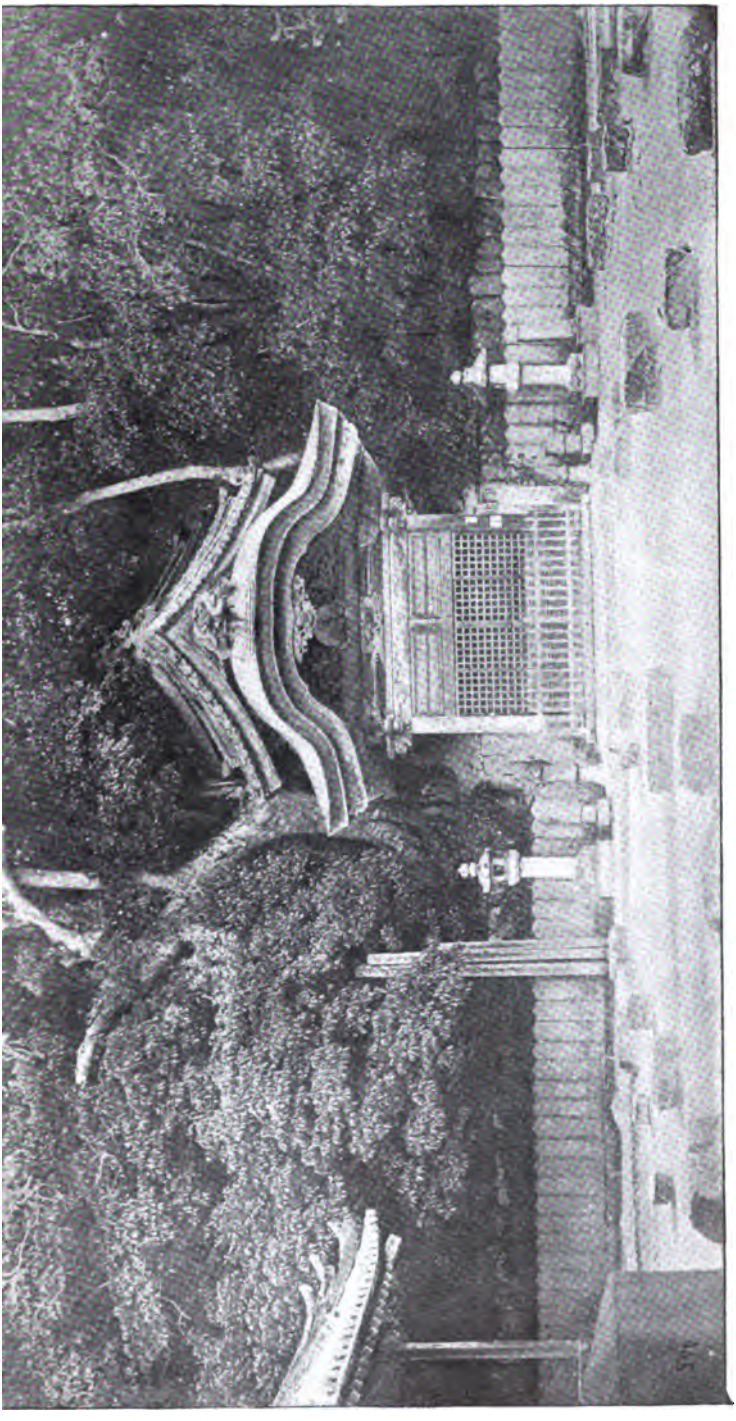
definitely known. The idea of a fence, such as Mr. Satow suggests, made by joining the cylinders with bamboos passed through the holes would be most obvious. But I am not aware that Mr. Satow really found any such bamboos, and the position of the cylinders shown in this picture, and as we examined them *in situ*, showed that the lateral apertures were directed outwards, thus precluding the idea of lateral connection. Moreover, the cylinders are placed so close together as to render any such connection improbable.

I was quite anxious to obtain one or two specimens of these cylinders for the National Museum, and my experience in this connection may not be without interest to those who like to speculate upon the motives of human conduct. It occasionally happens that the mounds are sold by the Government, for agricultural purposes, when the cylinders are destroyed by the plow by thousands. In the mounds still uninjured by the laborer the cylinders are being destroyed by the effects of the weather. Such being the case, one would naturally suppose that the authorities would readily second any effort to preserve specimens of the cylinders from destruction in public museums. But a more pronounced case of dog-in-the-manger than was exhibited in this matter by the Japanese officials has not come to my experience.

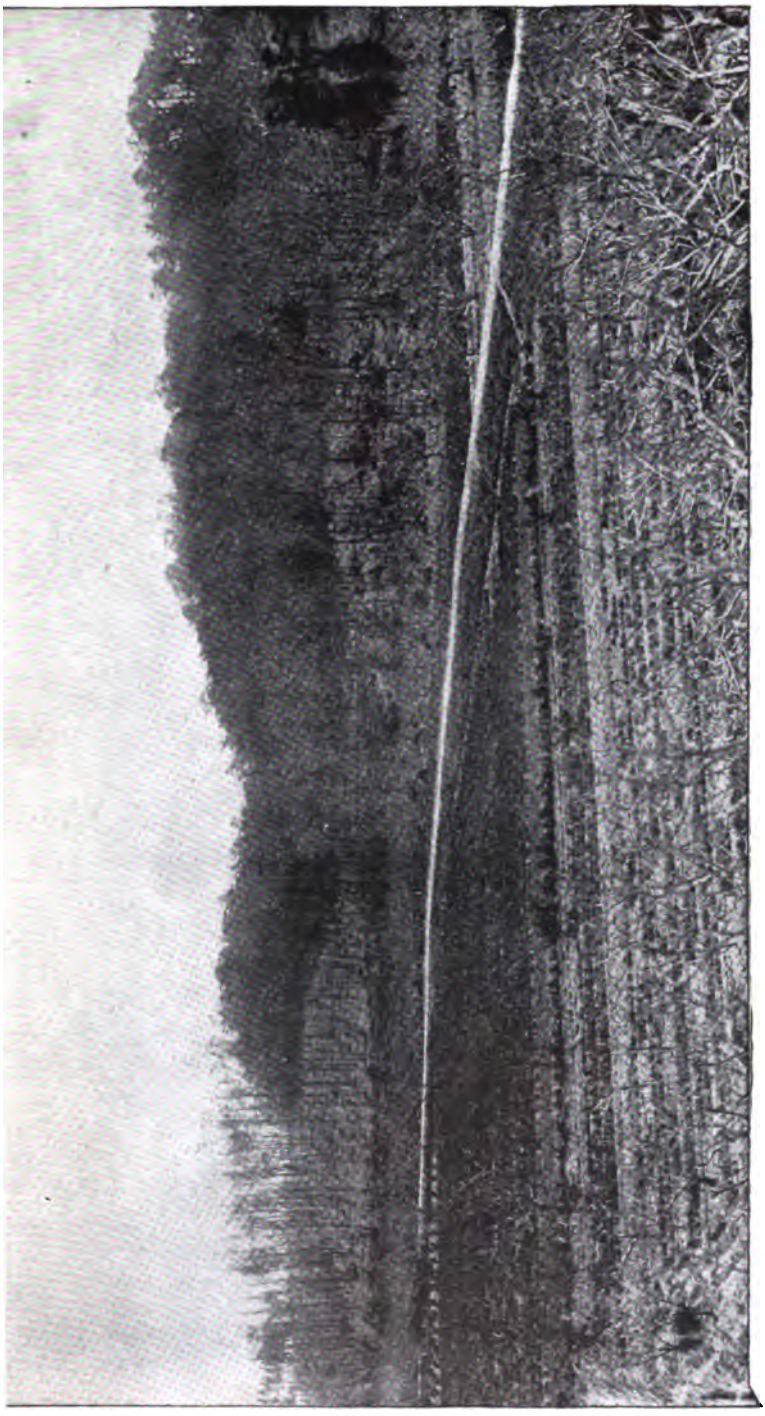
One day Mr. Gowland and I made a trip to Nara for the purpose of getting some cylinders from the mound represented in Plate XLIV. This, and another mound near by, had been disposed of for agricultural purposes, and we were therefore confident of success. Accompanied by the Governor and another official of the Ken, we soon reached the mounds, about 2 miles out, and threading our way across the mud of the drained moat we found the exceptionally fine exposure of cylinders which the photograph shows. But when we broached the matter of digging them out, we were told that authority to do so must come from Tokio. Well, there was no other course open to us, and I concluded, that at the risk of being snubbed, I would do my best to get some cylinders for the National Museum. My first application was to the minister of education, Mr. Arinori Mori, but he declared that he could not aid me in the matter. The president of the Imperial University, Mr. Watanabe, had already assured me verbally that if I would write to him he would be most happy to aid me. I did write to him, and his secretary "was instructed to convey Mr. Watanabe's regrets that he could not assist" me. Finally I ventured to apply directly to the Imperial Household Department. In my letter I stated that there were two mounds near Nara "from which cylinders can be obtained with very little digging, and it will only be a short time when they will be destroyed by the effects of the weather." All my letters were written in behalf of the Smithsonian Institution and U. S. National Museum; but they availed nothing. The cylinders are being destroyed by thousands, and I could only bring home some of the fragments.

We have no clew to the date when the cylinders were introduced, but

CYLINDERS *in situ*, KONABE.



TOMB OF SHOTOKU TAISHI.



CHAMBERED MOUNDS. VIEW FROM THE MOUND OF OJIN TENNŌ.

CHAMBERED MOUNDS NEAR HATORI-GAWA.

ENTRANCES TO CHAMBERED MOUNDS NEAR HATORI-GAWA.

it is always interesting to know what the Japanese have to say concerning their ancient monuments, although all conclusions from this source, even when they are established by official sanction, are to be accepted subject to considerable doubt both as to dates and sequence in time. In response to my inquiry, Mr. K. Yamanaouchi very courteously replied as follows:

The clay cylinders, or haniwa, have their origin about the year 700* [400 A. D.], and since then they were in constant use till about the year 1600 [940 A. D.] for fortifying the loose soils around misasaki and the graves of noted personages.

The lateral apertures were perhaps made for binders to keep the cylinders firmly in row.

Most of the clay cylinders have been destroyed, and although no entire form of any one of them can at present be obtained, we can still discover that some of them were made into the forms of men and animals which were used as followers of the illustrious deceased, and buried with such persons.

The allusion to the "forms of men and animals" will be understood as we proceed.

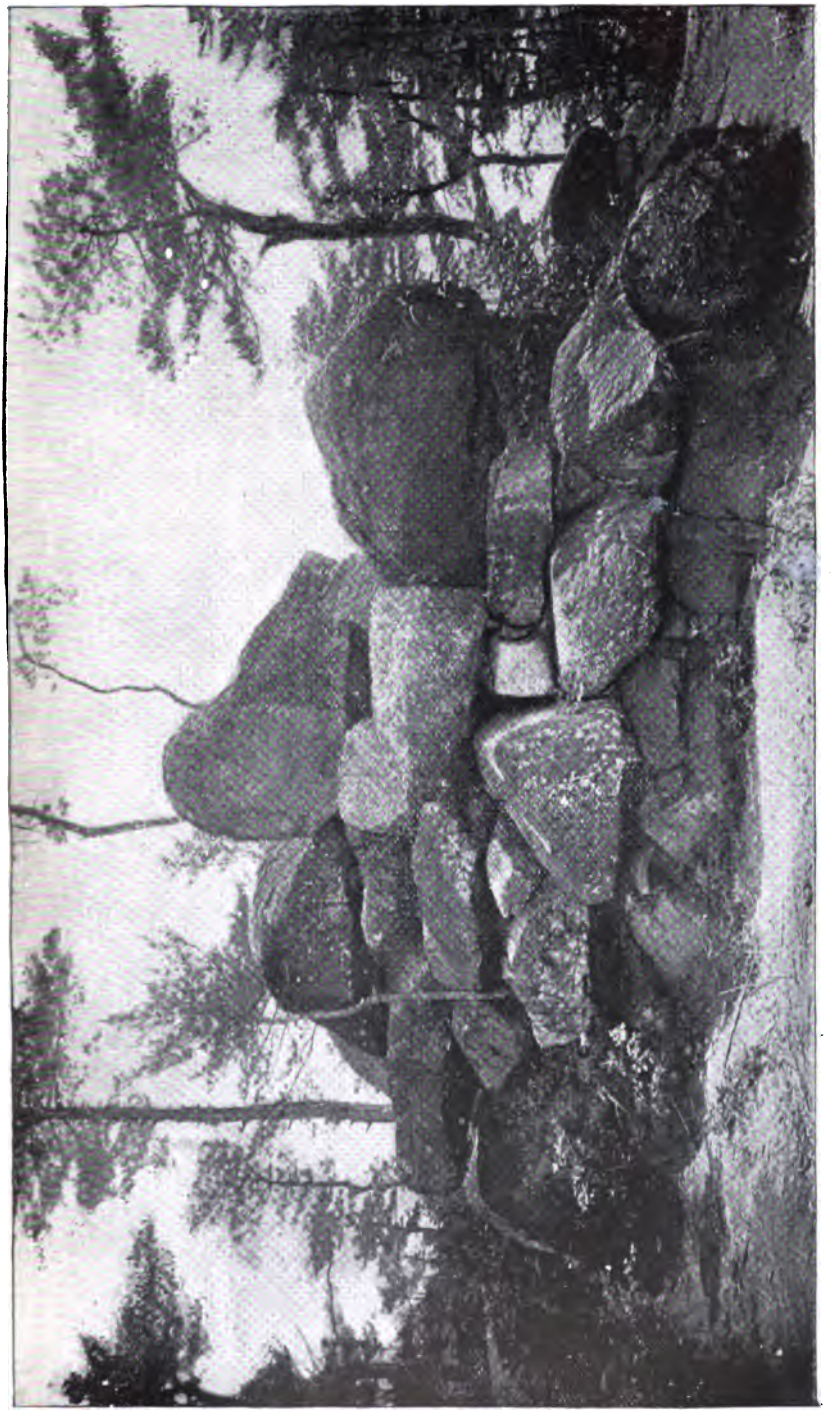
Before leaving the imperial tumuli I would mention one more, the mound of Shotoku Taishi. This mound contains a chamber which is now closed by the temple represented in Pl. XLV, the gates of which are kept closed. The base of the mound is surrounded by two concentric rows of upright stones, the inner row evidently the older. Each stone of this row bears a Sanskrit character.

Leaving now the tombs of the emperors we come to simple chambered mounds, which are very numerous in many sections of the country. These mounds appear as circular heaps, frequently among cultivated fields, covered with trees. Pl. XLVI shows two mounds near the tumulus of Ojin Tennō. These are quite large. A famous place for chambered mounds is near Hatori-gawa where the view represented on Pl. XLVII was taken. In this may be seen four distinct hillocks on the hillside, and many others are scattered about on every hand. These mounds all contain rock chambers, usually built of rough unhewn stones, some of them of immense size. Long entrance passages, through which one may walk upright for 30 or 40 feet or more, sometimes lead to the chambers, in which there may or may not be one, rarely two, stone coffins.

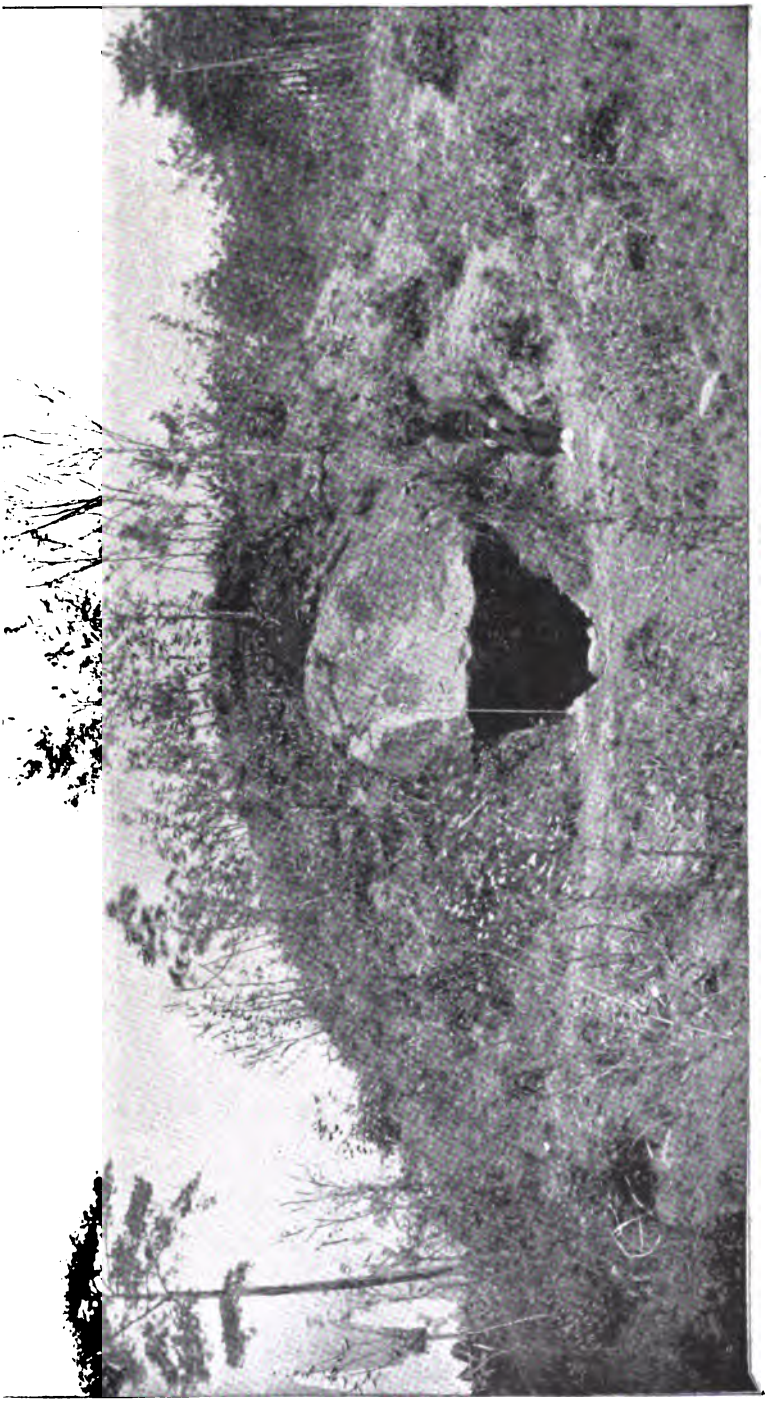
Mr. Gowland has recently discovered chambers in mounds in Idzumo made of cut stones carefully fitted together, in which were stone coffins of excellent workmanship. The coffins there have large openings in the sides, the object of which is not understood.

When the covering of earth is removed from the buried chambers it is found that the chambers open through the passages, usually to the south. The earth has been washed away from many such mounds, leaving the rocks exposed. In Pl. XLVIII, from Hatori-gawa, we see the entrances to four such chambers. The large mound in front shows the dolmen structure well.

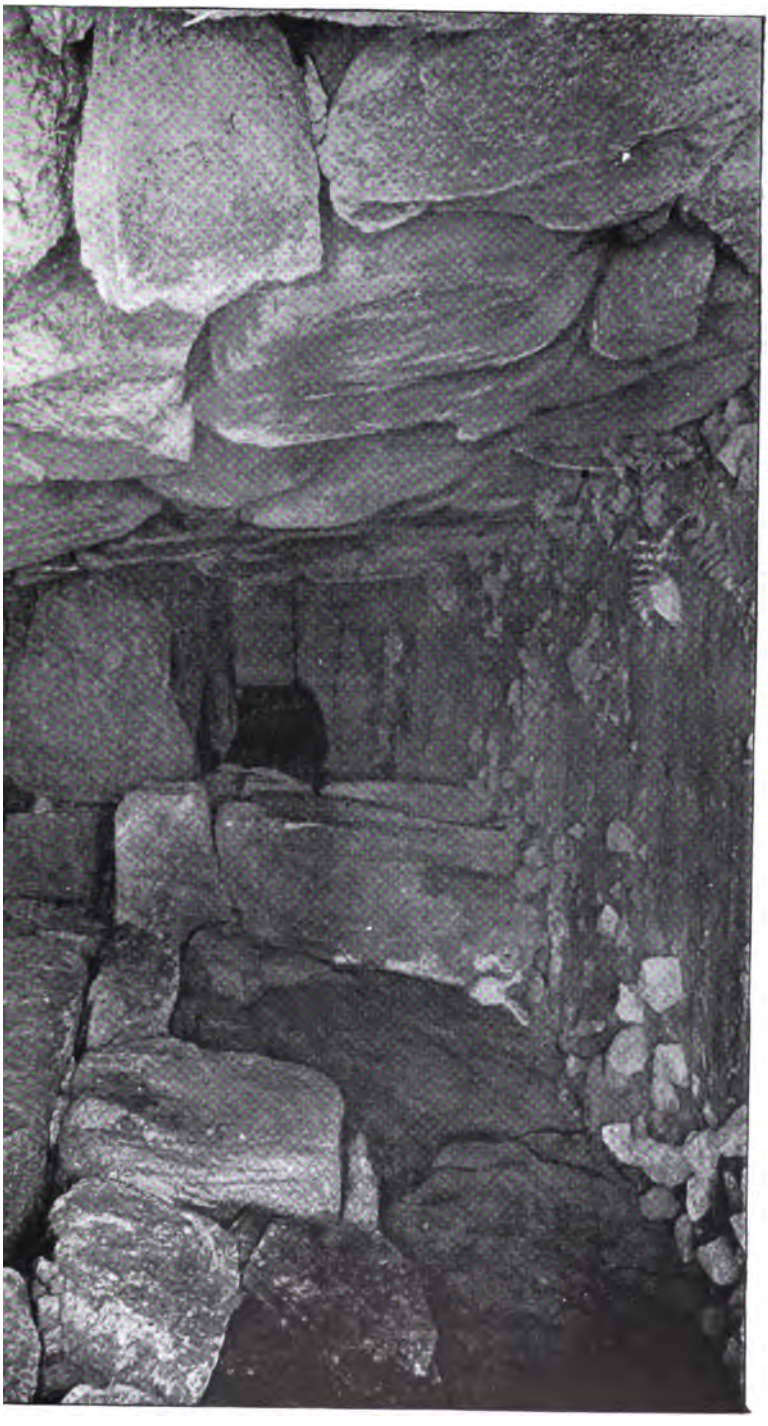
* The dates given are the years of the Japanese Empire, counting from 660 B. C., when the first *Emperor ascended the throne*. The reader is cautioned not to place *much dependence upon these dates.*



ROCKS OF CHAMBER EXPOSED.



MOUND WITH A DIVIDED CHAMBER.

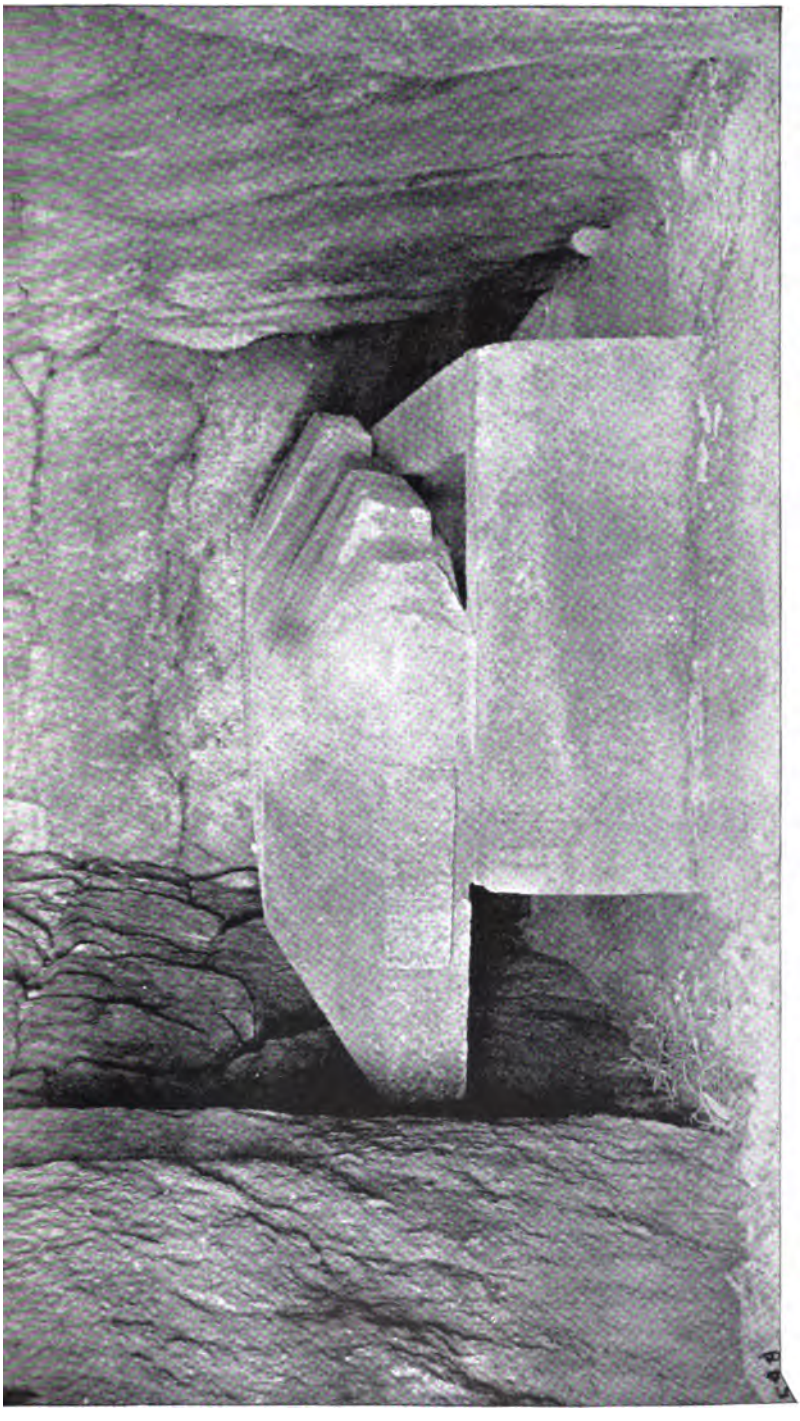


INTERIOR OF MOUND WITH A DOUBLE CHAMBER.

UNIQUE FORM OF DOLMEN.

INTERIOR OF DOLMEN (PRECEDING PLATE.)

PLATE LV.

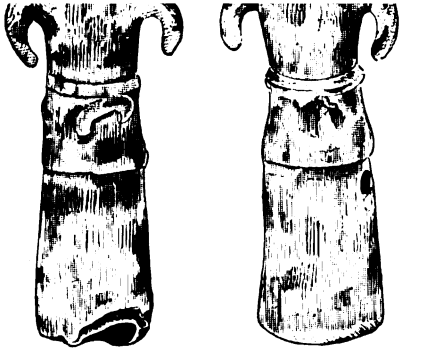


STONE COFFIN IN ITS CHAMBER.

1

2

1. STONE COFFIN. (From a Japanese sketch.)
2. CLAY COFFIN. (From a Japanese sketch.)



3

4

3 and 4. TSUCHI NINGIO. (From a Japanese sketch.)

JAPANESE COFFINS AND IMAGES.

i seems to date about the year 1200 [540 A. D.], but its predominant use
s traced before the year 1600 [940 A. D.].

is there is an addendum in the form of an "N. B.," which is
of note as indicative of the spirit in which suggestions or criti-
e received by the learned officials of the Imperial Household.
etter I had expressed a desire to know where the coffin repre-
n the sketch was to be found, and I ventured to say that the
ere "often too large to be introduced into the mounds through
eries, as you suggest, and sometimes there are two coffins."
ver was that the coffin came from Kumamoto, and the writer then
The fact that these stone coffins were introduced through the
into the center of the burial mounds can never be disputed,
e result of actual digging when the galleries were discovered.
eries that were discovered were large enough to introduce a
ne coffin." It would be a matter of very great labor to move
ose heavy stone coffins through a long gallery into its cham-
since some of the galleries are 50 and 60 feet in length, and
some cases the coffins are wider than the galleries, it is a natu-
ence that the chambers were frequently, if not usually, built
he coffins.

' the best preserved stone coffins I have seen is shown in Pl.
ographed in its original position in its subterranean chamber.
mound on the top of Domioji Yama.

s made of clay were once very extensively used. Good speci-
s rare, but fragments can be found in great abundance. Usu-
y are found in sepulchral caves or in mounds without rock
s. They are occasionally found also in chambered mounds.
wer part of Pl. LVI, from a Japanese drawing, is shown a clay
g out of the earth in Bizen. It stands on numerous short
s principal dimensions are in Japanese measure:*

.....	5 shaku.	8 sun.
.....	1 "	6 "
p of lower part.....	1 "	2.5 "
crests.....		4 "
ce of bottom of leg.....	1 shaku.	4 "
g.....		5 "

least one instance we found remains of stone and clay coffins
in a cave, showing them to have been contemporaneous.

II shows a clay coffin taken from a chambered mound in
When I first saw it and made the photograph it was perfect
after it was broken in two. The inside is shown in Pl. LVIII.
ounds have yielded a great variety of articles buried with the
ch as iron arrowheads, iron rings covered with bronze, rings
e or gilded bronze (Pl. XLIII), harness trappings of gold and
vords and other weapons, chains, glass beads, mirrors, and
ics.

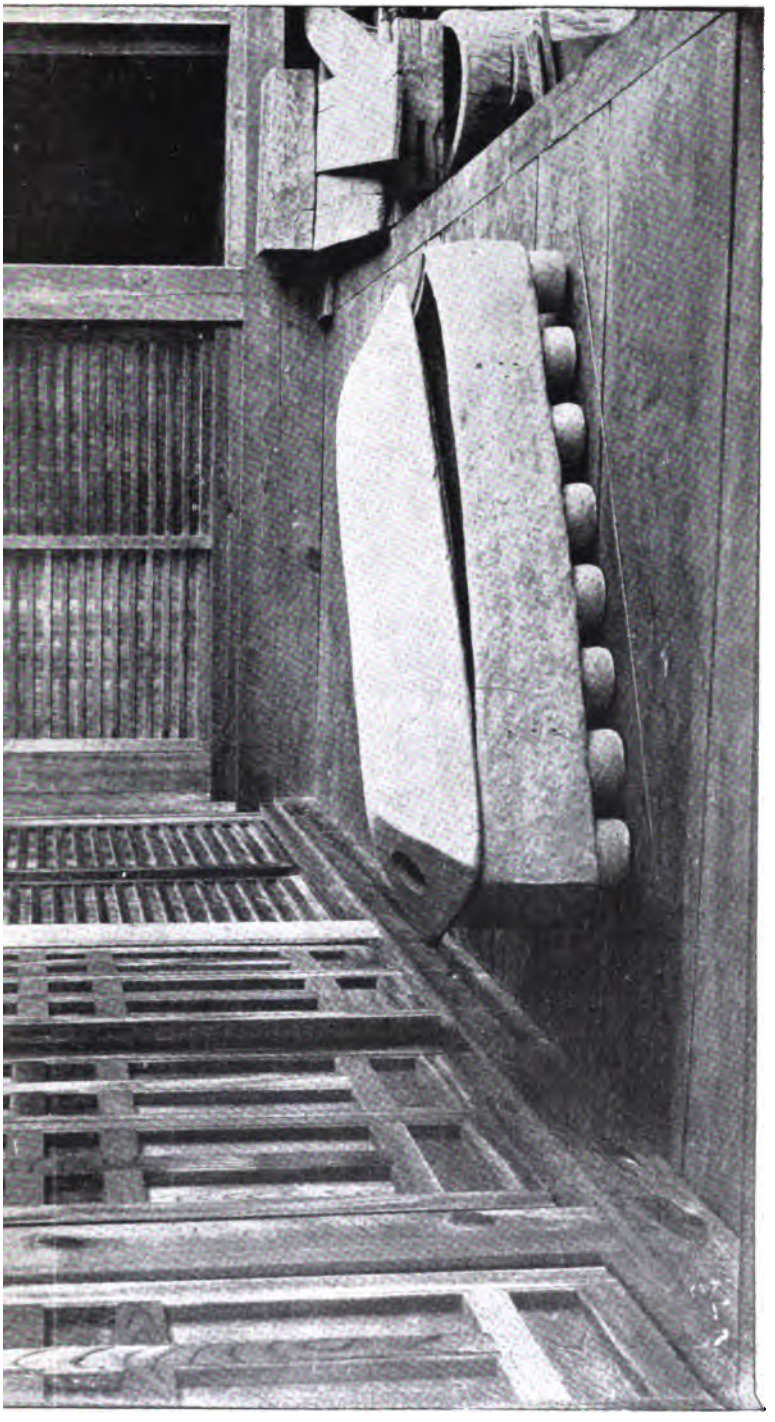
* A shaku is 1 foot; a sun is one-tenth of a shaku.

The tombs also contain vessels of pottery of various shapes, some of which are represented in Pl. LIX. Both the forms and style of decoration of these vessels, which are rudely made, are the same as those found in the tombs of Korea. Two very peculiar forms are shown in Pl. LX. It is a remarkable fact that the decoration on pottery from the Japanese mounds is much less elaborate than that found on the much older pottery of the shell-heaps and Yezo pits, which is usually designated as Aino pottery. The Aino pottery is so characteristically marked that the merest fragment can be recognized at a glance, without a possibility of confounding it with Japanese. It is difficult to explain the curious anomaly that the early pottery of a people who are famed at the present day for their productions in this kind of handiwork should be inferior to the earlier productions of their predecessors who have since absolutely lost the art of making pottery of any kind. A plate showing some of the peculiarities of the Aino pottery is published with an article entitled The Ainos of Yezo, by the present writer, published in the Museum Report for 1890.

It was a very ancient custom in Japan to bury the retainers of a prince standing upright around his grave. Like many other customs, this came from China. In a book entitled A Collection of Several Relations and Treatises Singular and Curious, of John Baptista Tavernier, Baron of Aubonne, London, 1680, there is a direct notice of this custom in Tonquin. There are two illustrations of the procession of a King's funeral, and the description says: "Many Lords and Ladies of the court will needs be buried alive with him, for to serve him in the places where he is to go. I have observed, in passing through the Estates of the Raja or Prince of Velouche, which border on the Easterly parts of the Kingdom of Visapour, that the Wives suffer themselves to be buried Alive near their deceased Husbands, instead of being burned, as they practice in other Provinces in the Indies."

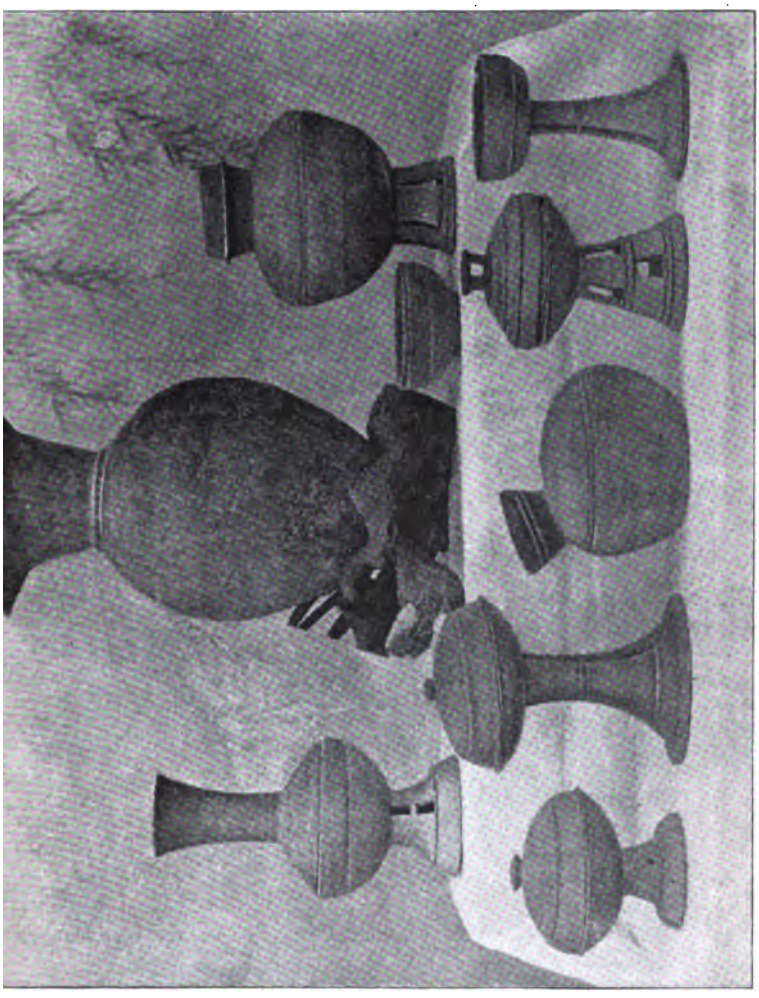
In the time of the Japanese Emperor Suinin (97 to 30 B. C.), his younger brother died and they buried all who had been in his immediate service around his tomb alive. "For many days they died not, but wept and cried aloud. At last they died. Dogs and crows assembled and ate them." The Emperor's compassion was aroused and he desired to change the custom. When the Empress Hibatsuhime no Mikoto died the Mikado inquired of his officers saying, "We know that the practice of following the dead is not good. What shall be done?" Nomi no Sukune then said, "It is not good to bury living men standing at the sepulcher of a prince, and this can not be handed down to posterity." He then proposed to make clay figures of men and horses and to bury them as substitutes. The Mikado was well pleased with the plan and ordered that henceforth the old custom should not be followed, but that clay images should be set up around the sepulcher instead.

Even as late as the year 646 an edict was published forbidding the burial of living persons and also the burial of "gold, silver, brocade,

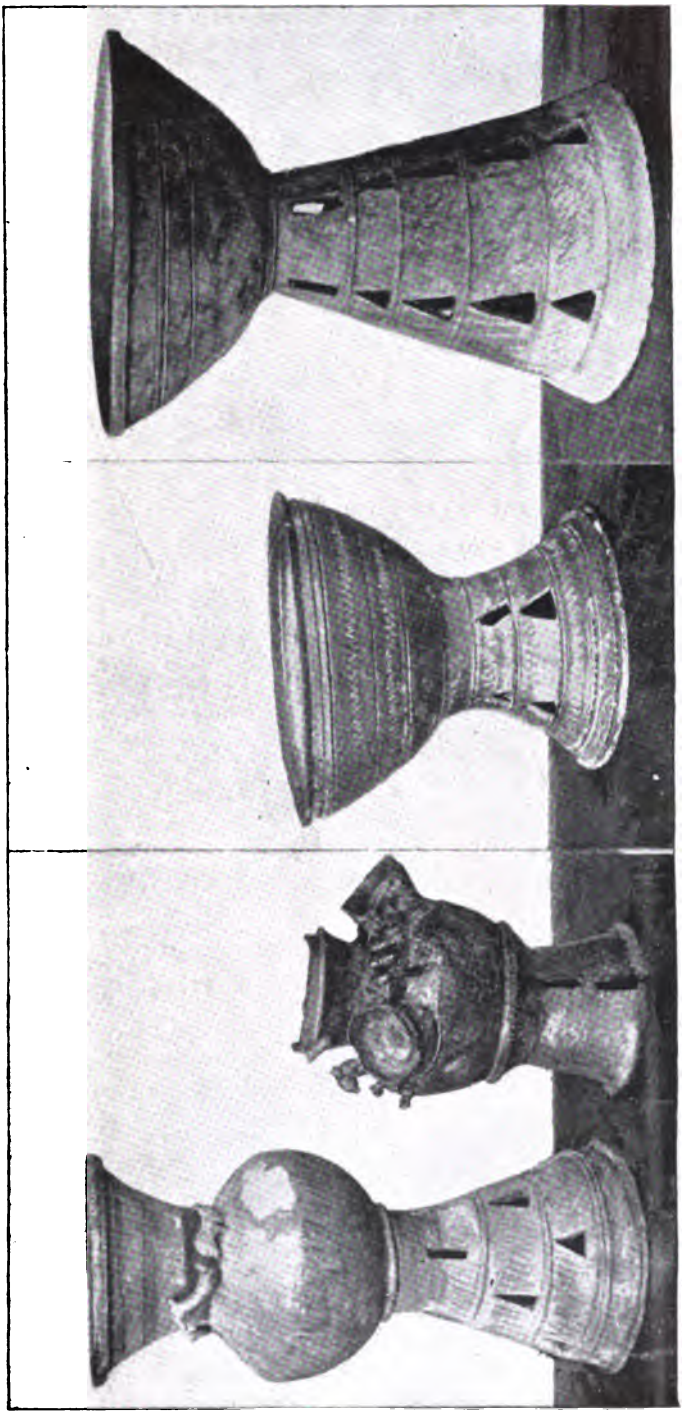


CLAY COFFIN. (PROVINCE OF SETTSU.)

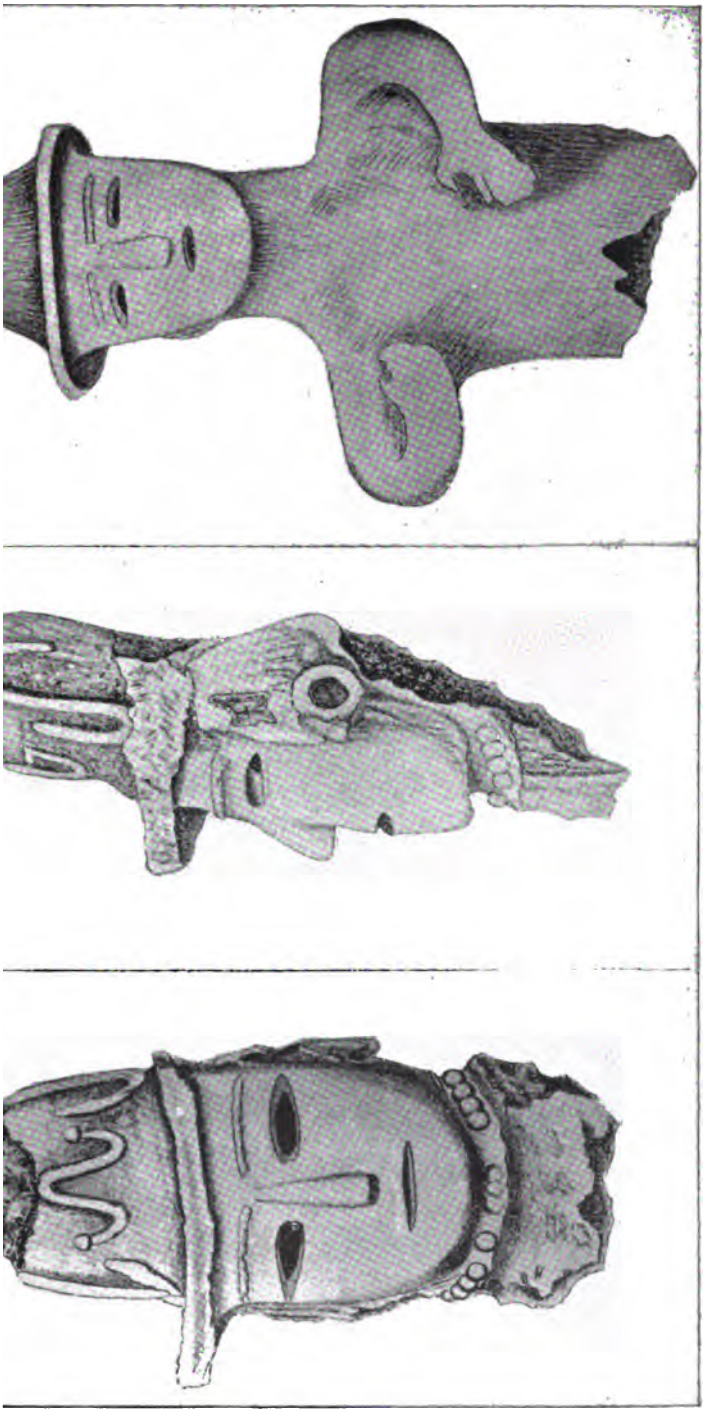
CLAY COFFIN. (PROVINCE OF SETTSU.)



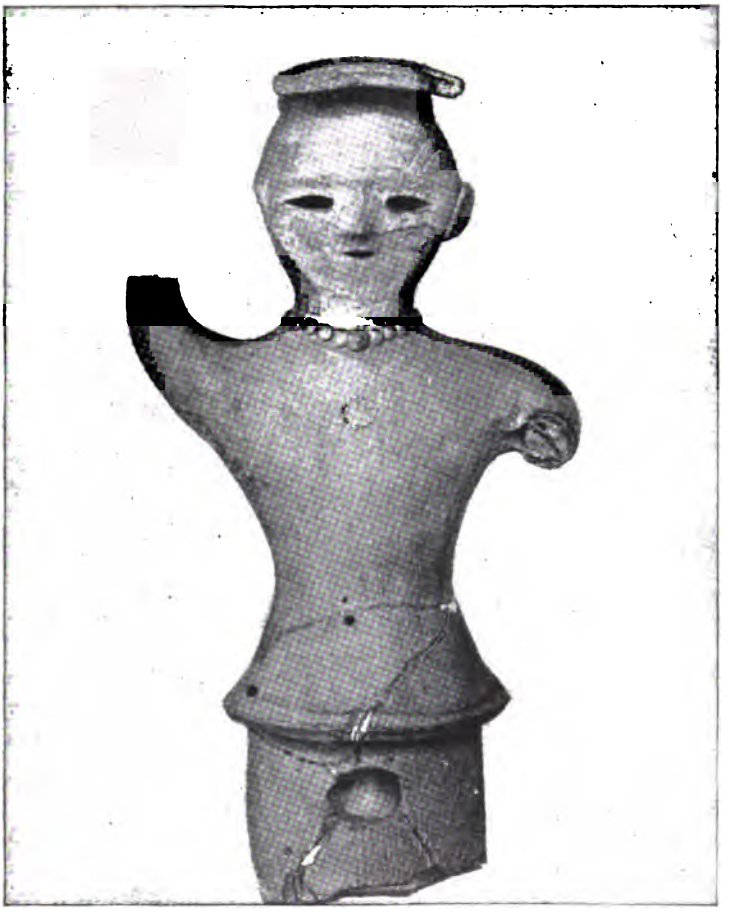
BURIAL POTTERY.



BURIAL POTTERY.



TSUCHI NINGIO. (FROM SATOW.)



TSUCHI NINGIO. (GOWLAND COLLECTION.)

TSUCHI NINGIO. (From Von Siebold.)

aper, or any kind of variegated thing." From this it might be inferred at the old custom of living burial was kept up to some extent even the seventh century. The edict reads, "Let there be complete cessa- n of all such ancient practices as strangling oneself to follow the dead, strangling others to make them follow the dead, or of killing the ad man's horse, or burying treasures in the tomb for the dead man's ke, or cutting the hair, or stabbing the thigh, or wailing for the dead an's sake."

The figures of clay thus introduced as substitutes for human sacri- es, and also to take the place of horses, are known as *tsuchi ningio.* pecimens of them are now very rare, and this fact leads to the suppo- ition that the figures were not buried, but left exposed on or near the urface of the ground.

Von Siebold has figured three of these found in the Province of Iusashi. He believes they were introduced about the year 2 B. C., nd used until about 700 A. D. Some of these figures show beads round the neck and one of them has earrings.

I have brought together several illustrations from different sources, howing the character of these curious figures. Pl. LVI, from a Japanese rawing, represents two figures found in Musashi. The height of hese images is about 20 inches.

Mr. Satow has described two specimens of *tsuchi ningio* from Kod- ake. Pl. LXI, copied from Mr. Satow's drawing, represents, on the eft, two views of a portion of what was originally a sitting figure, com- lete to the knees. The hat is rather curious. Around the neck are ead-like ornaments. Pl. LXII is a photograph taken from Mr. Gow- nd's specimen, now in the British Museum. Pl. LXIII is copied from on Siebold. The physiognomy of these figures is remarkable.

It seems probable that the figures were sometimes set on pedestals, nd I am disposed to believe that the cylinders with constricted tops, lready referred to (Pl. XLIII), were made to serve as supports for figures. he base of the last-mentioned image was evidently made to fit into a upport of some kind. There is a circular aperture at the bottom corre- ponding to those perforations which we have observed in the cylinders.

Figures of horses are sometimes found. One of the Japanese ketches in the Museum represents a horse and his trappings as crudely nolded as the human figures. It measures 2 shaku, 8 sun in length. Pl. LVI.)

In closing this imperfect account of the Japanese graves, I would gain allude to the much more extended observations of my valued riend and companion in Japanese travel, Mr. W. Gowland, and express he sincere hope that the results of his painstaking work in this field ill soon be given to the world. The illustrations in this report are all om original photographs, except when otherwise stated.

SOME ANCIENT RELICS IN JAPAN.

By Romyn Hitchcock.

Four stone figures in a small inclosure near Hirata Mura, in south. n Yamato, are probably the oldest stone images in Japan. I visited e place, in company with Mr. W. Gowland and Mr. K. Nagai, on the ternoon of April 1, 1888. The figures are at the foot of a small circur mound on a slight elevation, near the misasagi of Kimmei Tennō, rrounded by a hedge, with a securely locked gate in front. The nall mound itself is said to be the burial place of Kibi hime ō, the other of Kokioku Tennō and Kotoku Tennō.

While at Nara we presented letters to the governor of Nara ken, and ated our desire to have the gate opened that we might examine and ake photographs of the figures. An official letter was accordingly nt to the man in charge, and on our arrival we were met by a police ficer, a number of local officials, and most of the villagers, who esrted us to the place. But when we asked to have the gate opened e were told that it could not be done without permission from the nperial Household Department at Kyoto. This is a characteristic ample of Japanese official courtesy such as we more than once exerienced. The workman is free to enter the mound inclosure and to ure for it, but gentlemen engaged in archæological studies are not ermitted to have the gate opened, even when they do not care to ead inside, but only to get a clear field for a photograph. However, ith some difficulty we contrived to make several pictures. There eing no official regulation about cameras, I ventured to plant mine side the hedge and work it from without, which was done without monstrance. The result is shown in Pls. LXIV and LXV, which are fferent views of the same figures. The resemblance between these ide carvings and the images of Easter Island are quite noticeable.

The story told in a Japanese book, the Koko Nichi Roku, a work on apanese antiquities, dated the ninth year of Kwansei, was translated y Mr. Nagai as follows: "Long ago, four stone men were dug out of field near Kimmei Tennō's misasagi. The first one has three faces, ne second four, the third three, and the fourth two. Afterwards the atives put them on the misasagi and called them Schichi fuku jin even happy gods), which of course means nothing. The significance

of these figures is unknown, but some persons think that they were made for the pleasure of the workmen, and perhaps this may be so."

The figures are undoubtedly of great age, and of far more interest than the above account would indicate. They show traces of more than a common workman's skill, and while speculation concerning them is now profitless, they may some day prove of importance. The largest stands about 4 feet in height.

We can approximate to the date of some of the old Japanese monuments with some degree of confidence. For example, in the Province of Kawachi, a short distance from a much frequented pass over the mountain, there are some very old relics of Buddhism. On the top of a projecting spur of the mountain stands a weather-worn stone pagoda (Pl. LXVI), known as the *jiu-san to*. Its history is unknown, but it is probably one of the oldest Buddhist monuments of Japan. Near by and facing it is the remains of a cave, the roof and sides of which have almost crumbled away, leaving the back clearly exposed. Some roughly-drawn characters may be traced on the back, one of which evidently represented a face of a Buddha. There are other rocks near, which also bear traces of sculptures, but the forms can not be made out. Somewhat lower down there is a spot where it is evident there once were other stone structures, but it is impossible to infer their character or significance. A short distance from this place, in plain view, on another hillside, there is a second cave, evidently much larger, within which are the ruins of a stone pagoda (Pl. LXVII).

It was during the lifetime of the famous priest Shotoku Taishi, early in the 7th century, that Buddhism became firmly established in Japan, and many of the most celebrated temples were built by him. Among those are Horiu-ji, in Yamato, and Tenno-ji, in Ozaka. The tumulus of this Mikado is at the temple Eifuku-ji, near the village called Kasuga, in Kawachi, at the foot of the mountain where these relics are found (see Pl. XLV, in the preceding paper).

Considering the very active part taken by Shotoku Taishi, in establishing the Buddhist religion, and the fact that these ruins are found between his two most famous temples and near his final resting place, it seems probable that they date from his time or earlier, and are therefore more than 1,200 years old.

STONE FIGURES FROM YAMATO.

STONE FIGURES FROM YAMATO. (ANOTHER VIEW.)

ANCIENT STONE PAGODA.

m, 1891 —Hitchcock.

ANCIENT CAVE WITH REMAINS OF A STONE PAGODA.

PREHISTORIC NAVAL ARCHITECTURE OF THE NORTH OF EUROPE.

By GEORGE H. BOEHMER.

A tale of the times of old,
The deeds of the days of other years. (OSSIAN.)

INTRODUCTION.

In studying the art of shipbuilding, as performed in the North of Europe and illustrated by both Saga-accounts and actual remains, our attention is drawn toward numerous similarities with the ships of ancient Greece and Rome, which suggest a common origin. Although this is denied by many investigators, on the supposition that the ships of long-stretched build without sail, or only using it with favorable and constant winds, upon the comparatively quiet waters of the Egean, Ionian and Thyrrhenian seas, could not be an example to the people who navigated the northern seas, with their short, chopping waves, sudden changes of wind, tremendous storms, shoal shores, and sand bars, and that these people "had to be their own teachers,"[1] yet there lingers something in the naval structures of Scandinavia which seems to indicate that the maritime explorations of the people of the south, the Phœnicians, did have a tendency to influence the ancient inhabitants of the north in the construction of their vessels. It is true little is known in a direct way of the shipbuilding of the Phœnicians, yet the art taught them by the Egyptians and illustrated in some of the ancient relics of the seventeenth century B. C.[2] may be traced to the Greeks whose naval structures, at the height of their achievements, in many points show a remarkable resemblance to those one thousand years older,[3] and are reproduced in the Roman ships.

Of the naval structures of these two nations contemporaries have given accounts,[4] and while often written without technical knowledge their writings are not without value. Considerable attention has been given the subject during the last three and a half centuries, as shown by

[1] *Barthold:* Geschichte der Deutschen Seemacht. In Raumer's Hist. Taschenbuch, III Folge, Band I, 1850, p. 228.

[2] *Baumeister:* Denkmäler des Klassischen Alterthums, p. 1593, fig. 1656.

[3] *Graser:* Flotte einer ägyptischen Königin.

[4] Æschylus, Appian, Aristophanes, Cæsar, Diodor, Euripides, Hesychius, Livius, Plutarch, Pollux, Sophocles, Thucidides, Xenophon.

Dr. Emil Luebeck, one of the most recent and thorough investigators, from whose work[1] I have borrowed the bibliography of authors since 1536,[2] given below, and which has greatly aided me in the following description of the construction of the ships of ancient Greece and Rome.

[1] *Luebeck, Dr. Emil:* Das Seewesen der Griechen und Römer. Hamburg, 1890.

[2] *Baïf, De* (Lazarus Bayfius): Annotationes in L. II. de captivis et postliminii reversis, in quibus tractatur de re navali. Paris, 1536. *Doletus:* De re navali libel. Leiden, 1537. *Gyraldus:* De re nautica libellus. Basel, 1540. *Calcagnius:* De re nautica commentatio ad Gyraldum. *Stewechius:* Comment. ad Vegetium IV. 37. Leid., 1592. *Henricus Savilius:* De Militia Romana. Heidelberg, 1601. *Joseph Scaliger:* Animadv. in chron. Eusebii Thesaur. temp. Leid., 1606. *Willebrord Snellius:* Typhis Batavus sive histodromica de navium cursibus et re navali. Leid., 1624. *Thomas Rivius:* Historia navalis antiqua. London, 1633. *Scheffer:* Dissertatio de varietate navium, 1643 (reproduced in Gronov. Thes. Græc. antiq. XI, p. 769). *Marc Meibomii:* Notæ in Vitruvium (Edit. Joane de Laet). Amsterdam, 1649. *Scheffer:* De militia navali. Upsala, 1654. *Jacob Palmerius* (Paulmier à Grentemesnil): Exercitat ad optimos fere auctores Græcos. Leiden, 1668. *Meibom:* De fabrica triremium. Amsterdam, 1671. *Nicolaes Witsen:* Aeloude en hedendaegsche Schaeps-Bouw en Bestier. Amsterdam, 1671. *Scheffer* (pseudonym. Constantinus Opelius): De fabrica triremium Meibomiana. Amsterdam, 1672. *Rafael Fabretti:* De columna Traiana. Rome, 1683. *Isaac Vossius:* De triremium et liburnicarum constructione (reproduced in Grævius: Thes. antiq. Rom. XII, p. 709–734). Leid., 1699. *Père Languedoc* Traité sur les trirèmes, ou les vaisseaux de guerre des anciens. Paris, 1721. *P. P. de Châles and Sanadon:* In Journ. de Trévoux, Sep., 1722. *Admiral Thévenard:* In Mém. de l'Acad. roy. de Brest. Tome I, 1733. *Père de la Maugeraye:* In Journ. de Trévoux, Oct., 1722. *Deslandes:* Essay sur la marine des anciens et particulièrement sur leur vaisseaux de guerre. Paris, 1748. *Le Roy:* Seconde Mémoire sur la marine des anciens (Hist. de l'Acad. roy. des inscrip. xxxviii. Paris, 1777. *General Melvill* (by Pownall): A treatise on the study of antiquities. London, 1782. *Graf Carli:* Delle triremi. Milano, 1785. *Rondolet:* Mémoires de la marine des anciens. Paris, 1820. *Howell:* Essay on the war galleys of the ancients. Edinburgh, 1826. *H. v. Minutoli:* Ueber den Seeverkehr und das Schiffswesen der Alten. In Zeitschr. f. Kunst und Geschichte des Krieges, 1835. *Smith:* Ueber den Schiffbau der Griechen und Römer im Alterthum. Translated by H. Thiersch. Marburg, 1851. *Jal:* La flotte de César. Paris, 1861. *Keller:* Besprechung von Jal, La flotte de César. Philol. xix, 1863. *Graeser:* De veterum re navali. Berlin, 1864. Contin. in Philol. iii Supl. vol., pt. i; Philol. xliii. *Kirchhoff:* Ueber die Rede vom trierarchischen Kranze. In Verh. Berlin. Akad., 1865. *Guglielmotti:* Delle due navi Romane. Rome, 1866. *Lupi:* Il remeggio delle navi antiche, 1875. *Conze, Hauser und Benndorf:* Neue archäologische Untersuchungen auf Samothrake. 1880. *Joly de Maizeroy:* Conf. Du Sein, Hist. de la marine. Paris, 1863. *Fincati:* Le triremi. Roma, 1881. *Leopold Brunn:* In Verh. 35 Philol. Versamml. Leipzig, Treubner, 1881. *A. Cartault:* La trière athénique. Paris, 1881. *L. v. Henk:* Die Kriegsführung zur See. Berlin, 1881. *R. Werner:* Besprechung von Brunn "Axatos." Göttingen gel. Anz., 1882. *Roul Lemaitre:* Disposition des rameurs sur la trière antique. Revue archéol., 1883. *Boeckh:* Staatshaushalt der Athener. *Boeckh:* Urkunden über das Seewesen des attischen Staates. *A. Baumstark:* Navigatio. In Pauly's Real Encyklop. v. *Das Ruderboot.* In Wassersport, 1883, No. 17. *Saefkow:* Konstructionsplan einer Pentere. In Wassersport, 1884, No. 17. *Gilbert:* Handbuch d. griech. Staatsaltert. *Serre:* Les marines de guerre de l'antiquité et du moyen âge. Paris, 1885. *Breusing:* Die Nautik der Alten. Bremen, 1886. *Breusing:* In Iw. Müller's Handb. v. Klass. Alterth. Wiss. iv. Nachtrag. *Breusing:* Die Lösung des Trierenräthsels. Bremen, 1889. *Helbig:* Das homerische Epos aus d. Denkmälern erklärt. Leipzig, 1887. *Bauer:* Griech. Kriegsalterthümer. In Müller's Handb. v. Klass. Alterth. Wis., Bd. iv. *Blümner:* Tech-

The skeleton of the ship consists of the keel and the ribs. The keel a strong, square beam corresponding to the length of the ship.[1] o this is secured a stout plank, the false keel, which serves in the two-ld capacity of strengthening the keel and protecting it from injury. ı war vessels, oak was generally employed for the keel. Its ends, ightly elevated, served as a basis for the stem and stern posts; the most perpendicular prow was strengthened by an apron, and carried top-piece[2] with an ornament. The sternpost, too, was strengthened ' an apron, and carried a top piece.[3] The ∪-shaped ribs, seldom con-sting of one piece, were made of pieces exactly fitted and bolted gether.[4] In order to secure firmness and prevent lateral displace-ent of the ribs, they were provided with notches into which the keel ted; a longitudinal movement was prevented by the keelson, which ted into the intervals between the ribs, and thus kept them in place d pressed them firmly against the keel.[5]

The aprons of the prows joining the keelson at an angle, it required re a knee, which, while supporting the former upon the inner side, nnected them firmly with the keelson. These knees, made of stout, ooked timber, imparted the strength and power of resistance to the ows especially required by the stem for ramming.

The form of the hull is thus given by the ribs; the ship may be built arp upon the keel or its bottom may exhibit a shallow curve. It is own, however,[6] that the war-vessels of antiquity cannot have been ilt sharp upon the floor, but that even the largest of them must have d a flat bottom.

The frame having been made, the hull was formed by the planks, nich, parallel with the keel, were nailed to the ribs. The planks were aced upon edge, forming a smooth surface (carvel), although the ight ships of the Egyptians were clinker-built.[7]

A beam covered the heads of the ribs (the gunwale) into which the oles were inserted, which by means of leather straps offered a sup-rt to the oars that were fastened to them.

Many of the ships represented upon the Pompeian pictures and the

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logie. *C. Voigt:* Das System der Riemen-Ausleger im Klass. Alterth. In Was-sport, 1889. *Assmann:* Seewesen. In Baumeister, Denkmäler, iii. *Assmann, Ernst:* r Kenntniss der attischen Schiffe. In Jahrb. d. Kais. Deut. Arch. Inst., 1889. ns *Droysen:* Griechische Kriegsalterthümer. In K. F. Hermanns Lehrbuch, ii, 2. xatos": Festschrift, 35 Philol. Versammlung zu Stettin.

[1] *Breusing:* Nautik der Alten, p. 28.

[2] *Assmann:* Seewesen, p. 1602.

[3] *Pollux,* i, 90.

[4] *Breusing:* Nautik der Alten, p. 33; *Cartault:* La trière Athén, p. 49. *Assmann:* ewesen, p. 1601; *Homer:* Od. xii, 229; xiii, 74.

[5] *Breusing:* Nautik der Alten, p. 30, 33.

[6] *Assmann:* Seewesen, p. 1601, 1626. Berlin. philol. Wochenschrift, 1888, No. 1, p.

Röding: Allgem, Wörterb. d. Marine. *Breusing:* Nautik der Alten, p. 35. *Her-t,* ii, 96.

Trajan column show an open grating upon the railing, the angle of which, apparently, served the purpose of thole pins and rendered their application necessary for the upper tier of oars;[1] generally, however, even the ships of several tiers of oars had for each tier holes cut into the planks and required thole pins.[2] As at present, one thole was used in antiquity on the Mediterranean.[3]

The walls of the ancient war-ship, pointed at both ends,[4] do not appear to have been absolutely parallel amidships, but slightly bulged out;[5] vertically they fell to the water-line almost perpendicularly.[6] A projection of the ship's wall of 45 degrees toward the water-line is suggested by some,[7] but rejected by others who do not concede that the ancient pictures justify such an assumption, since such a form would secure but indifferent stability in the water.

The prow was often ornamented with carvings which possibly corresponded to the name of the ship.[8] The eyes[9] upon both sides of the prow in men-of-war, often taken for hawse-holes, were either painted[10] or carved and fitted in the prow. Their object appears to have been symbolic and intended to show the watchfulness to prevent accident.[11]

External strengthening was had by nailing planks upon the external wall in a horizontal direction (*Wales*), which by means of perpendicular bolts were fastened to each other, forming a network which had a tendency materially to strengthen the structure.[12] Corresponding pieces (*Weger*) were fastened to the inside, possibly serving as a layer for the lower oar-rows in polyeres, in order to spare the thin outside planking.[13]

Metal covering was not applied to the ships of antiquity,[14] but they were caulked and covered with a coat of pitch and tar, and finally par-

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[1] *Assmann:* Seewesen, p. 1608, 1628; *Baumeister:* Denkmäler, iii, p. 1627.

[2] *Boeckh:* Urkunden über das Seewesen des attischen Staates, p. 103.

[3] *Breusing:* Nautik der Alten, p. 33; *Assmann:* Seewesen, p. 1609.

[4] *Helbig:* Das homerische Epos aus den Denkmälern erläutert, p. 161, foot note 1.

[5] *Aristot:* De part. anim. 4, 10.

[6] *Brunn:* Verh. d. 35. Philol. Vers. p. 171; *Lemaitre:* Revue Archéol. 1883, i, p. 134; *Breusing:* Nautik der Alten, p. 39; *Assmann:* Seewesen, p. 1607.

[7] *Le Roy:* Sur la marine des anciens (Histoire de l'Acad. roy des inscript. et belles lettres, xxxviii, 1777, p. 542); *Melvill* (by Pownall) A treatise on the study of antiquities, London, 1782, p. 233; *Boeckh:* Urkunden, p. 115; *Smith:* Ueber den Schiffbau der Griechen und Römer, p. 40.

[8] *Assmann:* Seewesen, p. 1606.

[9] *Assmann:* Zur Kenntniss der antiken Schiffe. In Jahrbuch des Deutschen archäolog. Instit, 1889. Heft 2, p. 99; *Assmann:* Seewesen, p. 1597 and 1613; *Boeckh:* Urkunden, p. 103; *Jal:* La Flotte de César; *Baumeister:* Denkmäler, iii, p. 1617.

[10] *Blümner:* Technologie, iv, p. 455. Note 3.

[11] *Assmann:* Zur Kenntniss, &c. In Jahrbuch d. D. arch. Inst., 1889. Heft 2, p. 99; *Assmann:* Seewesen, p. 1597.

[12] *Assmann:* Zur Kenntniss, &c. In Jahrbuch d. D. arch. Inst., 1889. Heft 2, p. 102; *Assmann:* Seewesen, p. 1628.

[13] *Assmann:* Seewesen, p. 1602.

[14] Ueber die Alexandreia des Hieron. v. Syrakus.

tially painted[1] in the bow, apparently to facilitate the recognition of the direction taken by a vessel in sight.[2]

The war vessels do not appear to have had full decks, from the fact that the mast had to be taken down before the battle; partial decks appear in the bow and in the stern; the midship was open, but some representations from the eighth century B. C.[3] show small bridges or gangways (plankways) on both sides of the mast, extending from the fore end to the aft end, partly covering the ship and forming a bridge upon which the fighting crew stood. A narrow plank fastened to the inside of the ship's wall also served a similar purpose. Even at Cæsar's time completely covered vessels were not in general use,[4] and even those called "decked" did not have what is now called "a deck."[5]

Before the battle the mast, which rested in a block upon the keel, had to be laid down,[6] and for this purpose a small longitudinal opening had to be left. It was the custom to penetrate the enemy's line in full force, in order to dislocate his oars. To thus render his ship defenseless to the spur thrusts, the oars of the attacking party had to be drawn in at the decisive moment so as to prevent their being broken. In order to accomplish this the small width of a decked ship would have been insufficient, while a broken deck afforded ready egress above.

The peculiar method of naval warfare, consisting principally in an effort to disable the enemy's ship by ramming, required a resistance scarcely to be found in the comparatively slight-built ships of antiquity, and special precautions had to be taken to secure, by means of additional devices and appliances, the longitudinal strengthening of the otherwise rather frail structure. Such appliances were the strut-frame and the girding. The former was first demonstrated[7] as consisting of two long beams, which, resting upon numerous supports, connected the two frames in such a manner as to leave a longitudinal opening for the raising and lowering of the mast. These beams, by covering them with planks, were converted into foot bridges for the fighting crew.[8]

One of the principal dangers to which the ship of antiquity was exposed, and which threatened collapse to the frail structure was from the breaking of the back,[9] which was apt to happen in a vessel crossing the waves, whereby the midship was lifted in the mass of water, while the prows, without any support, hanging over the trough, were apt to sink by their own weight and thus tend to break from the keel. In

[1] *Blümner:* Technologie, vol. IV, p. 453.

[2] *Helbig:* Das homerische Epos aus den Denkmälern erläutert, p, 161, note 1.

[3] Monumenti dell Inst. IX., pl. 40, 3 and 4; Annali 1872, p. 153.

[4] *Cæsar:* De bel. civ. iii, 7; *Cicero:* Ad Attic. v, 12, 13.

[5] *Assmann:* Seewesen, p. 1607.

[6] *Assmann:* Seewesen, p. 1616; *Breusing:* Nautik der Alten, p. 48; *Droysen:* Griech. Kriegsalterthümer, p. 289; *Jal:* Archéol. Nav. I, 288.

[7] *Assmann:* Seewesen, p. 1602.

[8] Ibid, p. 1604.

[9] *Breusing:* Nautik der Alten, p. 183.

that event the walls, unsupported by connecting beams, were apt to become loosened from their holds and cause the whole structure to collapse.

In order to prevent this sinking of the prows the *girding* was applied, consisting in the tying of the ship by means of a stout cable, the *hypozome* (tormentum). Many views have been expressed as to the nature and the application of the hypozome.[1]

According to the theory which is most consistent with the accounts given in the ancient literature[2] the girding was performed by a single or double cable fastened to the heavy plaited rings surrounding stem and stern posts, often met with in ancient illustrations[3], and running upon stout crutch-like supports, being probably tightened by pulleys as soon as the connections began to loosen from continued spur thrusts or by heavy seas.

The sticks forming the supports for the hypozome, and which according to ancient accounts were part of the articles of equipment of a ship, have heretofore been thought to be lateral supports of the mast.[4]

The most terrible weapon of the ancient war ship was the spur, a structure projecting from the bow, covered with iron or copper, probably an invention of the Phœnicians, whose vessels carried it 700 B. C. It was at first placed below the water line, but in the ancient Greek ships it was placed above the water[5] at a point where keel, stempost, strutframes, and wales centered their combined force, in order to make the destructive thrust as effective as possible.

The effective application of the oar is dependent on the proportion of the inner to the outer lever, which has been found to be the most satisfactorily accomplished with a proportion of 1 : 2–3.[6]

For determination of size but very insufficient data exist, principally in the length and width of the ship sheds,[7] which, however, can be but relatively correct, since alongside of the ship articles belonging to it had to be stored. A scale is also found in a passage by Vitruvius,[8]

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[1] *Scheffer:* De militia navali, i, 4, p. 48, Upsala, 1654; *Le Roy:* Troisième mémoir sur la marine des anciens, Histoire de l'Académie, xxxviii, p. 589, Paris, 1777; *Schneider:* Vitruv., x, 15, 6, Leipzig, 1808; *Boeckh:* Urkunden, p. 134; *Beger:* Thesaur. Brand., III, 406; *Montfaucon:* L'antiquité expliqué, iv, 2, p. 214, pl. 134; *Smith:* Schiffbau der Griechen und Römer, p. 30; *Breusing:* Nautik der Alten, p. 171; *Assmann:* Jahrb. d. K. D. Inst., 1889, 2 Heft, p. 99, 100; *Graser* (Dumichen): Flotte einer ägyptischen Königen; *Assmann:* Seewesen, pp. 1594, 1604, 1614; *Baumeister:* Denkmäler d. Klass. Alterth., III, p. 1593, 1604, fig. 1671; Musée de Marine du Louvre, p. 8; Berlin. Phil. Wochenschrift, 1889, Nos. 31, 32; *Droysen:* Griechische Kriegsalterth., p. 259; *Breusing:* Die Lösung der Trierenfrage, p. 26.

[2] *Assmann:* Seewesen, p. 1594, 1604, 1614.

[3] *Baumeister:* Denkmäler d. Klass. Alterth. III, p. 1604.

[4] Berl. philol. Wochenschrift, 1889, No. 16, 31, 32.

[5] *Assmann:* Seewesen, p. 1613.

[6] *Assmann:* Seewesen, p. 1608.

[7] *Droysen:* Griechische Kriegsalterthümer, p. 279.

[8] *Vitruvius:* de architectura, i, 2, 4, "in navibus ex interscalmis, quod διπηχαίη dicitur;" see *Marcus Meibomius:* De fabrica triremium. Amstelod., 1671, reprinted; *Graevius:* Thesaur. antiq. Rom., xii, 553, 573.

in which the laws of symmetry enter into architectural construction. A still more certain mode is found in the interscalmium; that is, the space between the oar ports, which by practical experience is accepted as most nearly correct at 2 ells = 3 feet. In computing the length, then, additional to the result obtained from interscalmium measurements the free space in the stem and stern will also have to be taken into account. For a 31-seater these are accepted as 12 feet aft[1] and 6 feet in the stem; we thus have the following formula:

$$x \times 3 + 12 + 6 = \text{length of ship.}$$

The space occupied by each rower is estimated by Lemaitre at (1.60 meters) 5⅓ feet in width, and allowing for the longitudinal middle space (80 centimeters) 2 feet, we obtain an approximate width of that class of ship of about 17 feet.

A further estimate of the width of the ships is found in the size of the anchor cable,[2] of which each one-half inch thickness is computed as representing 1 foot width of ship at the water line; hence a 6-inch cable should correspond to a ship 12 feet wide at the water line.[3] It is, however, thought[4] that in view of the very sharp build of the ships a larger factor of width may be taken for each one-half inch of thickness of the cable.

The draft of the war-vessels of antiquity appears to have been very small, amounting in the largest of which we have information to a maximum of 1.5 meters.[5]

THE GERMANIC PEOPLE.

The first historic account of the ships of the people occupying the shores of the Northern Seas we find in Cæsar's Naval Campaign against the Veneti, in the year 54 B. C.,[6] as follows:

"For their ships were built and equipped after this manner: The keels were somewhat flatter than those of our ships, whereby they could more easily encounter the shallows and the ebbing of the tide; the prows were raised very high, and in like manner the sterns were adapted to the force of the waves and storms which they were formed to sustain. The ships were built wholly of oak, and designed to endure any force and violence whatever; the benches, which were made of planks a foot in breadth, were fastened by iron spikes of the thickness of a man's thumb; the anchors were secured fast by iron chains instead of cables, and for sails they used skins and thin dressed leather. These were used either through their want of canvas and their ignorance of its application, or for this reason, which is more

[1] *Lemaitre:* Revue Archéolog., 1883, i, p. 149.
[2] *Boeckh:* Seeurkunden, p. 163.
[3] *Cartault:* La trière Athén., p. 246.
[4] *Graser:* De vet. re nav., p. 20.
[5] *Assmann:* Seewesen, p. 1601. Berlin. philol. Wochenschrift, 1888, No. 1, p. 28.
[6] *Cæsar,* De Bello Gallico, iii, cap. xiii.

probable, that they thought that such storms of the ocean and such violent gales of wind could not be resisted by sails, nor ships of such great burden be conveniently enough managed by them. The relative character of the two was of such nature that our fleet excelled in speed alone and the plying of the oars; other things, considering the nature of the place and the violence of the storms, were more suitable and better adapted on their side; for neither could our ships injure theirs with their beaks, so great was their strength, nor on account of their height was a weapon easily cast upon them; and for the same reason they were less readily locked in by rocks. To this was added that, whenever a storm began to rage and they ran before the wind, they both could weather the storm more readily and heave to securely in the shallows, and when left by the tide feared nothing from rocks and shelves; the risk of all which things was much to be dreaded by our ships."

The ships employed by Cæsar during his expedition to Brittany were the *naves actuariæ*,[1] vessels of surpassing speed,[2] such as were employed by the pirates.[3] They were propelled by oars, and according to Isidorus[4] also employed sails. The designation *actuaria* appears to have been a multiplied and varied one[5] and embraces vessels of various sizes, number of oars,[6] and purposes. According to Dr. Luebeck[7] it may be assumed with a degree of certainty that they did not belong to the freight ships (*onerariæ*),[8] nor are they to be considered as war-vessels proper of Cæsarian times.[9]

During the expedition to Brittany these *actuariæ* took the place of the *onerariæ* for the transport of troops, horses, and war paraphernalia, although it is stated explicitly that they were built as *actuariæ*, and for that reason they were enabled to keep pace with the war-vessels

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[1] *Luebeck, Emil*, Das Seewesen der Griechen und Römer. Hamburg, 1890.

[2] According to *Nonius*, xiii, 9. the naves actuariæ were "naviculæ celeres, dictæ quod cito agi possint."

[3] Sall. hist., lib. ii, "pauca piratica actuaria navigia."

[4] *Isidor.* Orig., xix 1; "actuariæ naves sunt, quæ velis simul aguntur et remis."

[5] *Assmann*, Seewesen, p. 1623.

[6] *Cic.* ad. Attic., xvi, 3, 6: "*hæc ego conscendus e Pompejano tribus actuariolis decem scalmis.*" And *Livius*, xxxviii, 38: "*Tradito et naves longas armamentaque earum, neve plures quam decem naves actuarias, quarum nulla plus quam triginta remis agatur, habeto.*"

[7] *Dr. Emil Luebeck:* Das Seewesen der Griechen und Römer. Hamburg, 1890. (The author has made a thorough study of ancient Greek and Roman naval affairs, and some of the references employed have been taken from his essay.)

[8] *Sisenna:* Histor., lib. iii (Nonius, xiii, 8): "*Quibus occisis actuarias ad rigisti naris, item complures onerarias incendunt.*"

[9] *Cæsar:* De Bell. gall., v, 2, 1: "*Eo cum advenisset, circuitio omnibus hibernis, singulari militum studio, in summa omnium rerum inopia, circiter DC eius generis, cuius supra demonstrarimus, naves et longas xviii invenit instructas, neque multum abesse ab eo, quin paucis diebus deduci possint.*" The words "*supra demonstravimus*" referring to v., 1, 3: "*ad onera et ad multitudinem tumentorum transportandam paulo latiores, quam quibus in reliquis utimur maribus. Has omnes actuarias imperat fieri, quam ad rem multum humilitas adiuvat.*"

proper; they appear to have been connected with the war navy[1] without themselves being men-of-war; they were, however, like men-of-war, provided with a ram.[2]

Almost fifty years now pass, until in the year 9 B. C. Drusus Germanicus, the first Roman general who ascended as far as the North Sea, gave a victorious battle to the Bructers upon the Ems. Strabo, in his account, unfortunately does not minutely describe the vessels employed by the latter, yet they appear to have been rather unsubstantial structures.

A better account is given by Vellejus Paterculus, who about 5 A. D., under Tiberius, served as prefect of cavalry; he gives them[3] as "*cavatum, ut illis mos est, ex materia*," thus indicating them to have been dugout; and in such a vessel, capable of accommodating but one person, the chief of the Northalbings, the people occupying the territory adjacent to the mouth of river Elbe, paid his respects to the conqueror.

Such a dugout, now in the museum at Kiel, was found in the Wolburgsau marsh in South Dithmarschen; it is 11 feet long, 2 feet wide, 1 foot deep, and is hollowed out of an oak tree.[4]

In 15 A. D. Germanicus[5] had built near the mouth of the river Rhine one thousand ships with sharp prows, but wide, to better resist the waves; some with flat bottoms, to enable them to run ashore with impunity; upon a number of them steering apparatus were provided at both ends, so as to permit propulsion in either direction. Many were decked, for the accommodation of throwing machines. Equally useful for sailing and rowing, they were imposing and serviceable and inspired the soldier with confidence. The fleet succeeded in reaching the mouth of the river Ems, but, after a victory over the Cheruskers it was shipwrecked in a storm, although the wind blew from the south.[6]

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[1] *Cæsar:* De Bell., civ. I, 34, 2: "*profectum Dominitium ad occupandum Massiliam navibus actuariis septem;*" iii, 62, 2: "*His paratis rebus, magnum numerum levis armaturæ et sagittariorum aggeremque omnem noctu in scaphas et naves actuarias imponit;*" iii, 102, 5: "(Pompejus) *biduum tempestate retentus, navibusque aliis additis actuariis in Ciliciam atque inde Cyprum pervenit.*"

[2] De Bell. Alex., 44: "*navibus actuariis, quam numerus erat satis magnus, magnitudine quamquam non satis iusta ad proeliandum, rostra imposuit.* Cnes: de Bell. Goth., iii, c. xiii: "*neque enim his nostræ rostro nocere poterant.*" A similar remark is made in cap. xiv. The rostrum (ἔμβολον) supplied a very formidable instrument of ancient naval warfare. It was a beam springing from a part just below the prow and topped with sharp iron points or an iron representation of a ram's head. Though formerly always above the water, they were in later times placed below it, and thus rendered more dangerous. *Lemaitre*: Revue archéologique, 1883, p. 142: "*Armée d'un éperon, elle se jetait comme un javelot sur ses adversaires pour les frapper d'un coup mortel.*"

[3] *Vellejus Paterculus*, ii, c. 107.

[4] Archiv der Schleswig-Holstein Lauenburg. Gesellsch. f. vaterl. Geschichte, Bd. XXIII, 4te Folge. Jahrbücher für die Landeskunde, Bd. XII. Zeitschrift d. Ges. f. d. Gesch. d. Herzogt. Schleswig-Holst. Lauenb., Bd. II, 1872.

[5] *Tacitus*, Ann., 6.

[6] *Tacitus*, Ann. ii, 23.

The occurrence of a general wrecking of an entire fleet when the wind was offshore does not speak well for the construction of the ships; inexperience with the dangers and the coasts of the Northern seas and storms, however, may enter somewhat as an argument in favor of the construction, although it may here be mentioned that the war-ship of antiquity was of slight build, shallow upon the keel, and drew about 1 meter of water,[1] and that their construction was effected in a comparatively short time.[2]

A progressive ratio in the art of naval construction thus becomes apparent as we recede westward from the river Elbe, where at the time of the Roman invasion dugouts only, of small capacity, represented the vessels of the occupants of the north coast of continental Europe.

During the years 1885 to 1889, while excavating for a free port at Bremen, seven canoes were discovered in the alluvial land on the outside of the Weser dike at depths of from 2 meters (6½ feet) to 4 meters (13 feet) below the present surface level. They were dug out of the trunks of oaks—axes apparently having been employed for the purpose—flat-bottomed and without keel, but with the prow cut obliquely, and with auger holes provided for the insertion of the oars. Of the seven canoes four were entirely demolished; of the remaining three the dimensions were 10.5 meters (35 feet) long, 0.75 meter (2 feet 6 inches) wide; 10 meters (33 feet 4 inches) long, 1.25 meters (3 feet 6 inches) wide; 8 meters (26 feet 7 inches) long, 1.20 meters (3 feet 3 inches) wide, with a height of from 50 to 70 centimeters (1 foot 5 inches to 2 feet 2 inches).[3]

I am also informed that several other specimens of this type are preserved in the municipal museum at Bremen.

The most progressive of the coast tribes appear to have been the Chauci, Frisians, and Batavi. The elder Pliny[4] speaks of the piratical ships of the Chauci which visited the rich provinces of Gallia and carried retribution. They still were only dugouts, but able to carry thirty men. It was the first time that Teutons had ventured upon the open sea, and this venture formed the beginning of the naval enterprises of our ancestors of the northern coast of continental Europe; in fact they soon became dangerous to such a degree that Corbulo, the governor of Netherlandish Germania, in 47 A. D. was obliged to call out the entire fleet of the Rhine to keep the enemy in check.[5]

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[1] *Lemaitre*, Revue archéologique, 1883, 1, p. 146; *Assmann*, Zur Kenntniss der antiken Schiffe—Jahrbuch d. Kais. Deutsch. Archäolog. Inst., 1889, 1616, 1626. Berliner philol. Wochenschr. 1888, No. 1, p. 28; *Brunn*, Verhand. d. 35 Philol. Vers., p. 177. *Luebeck*, Das Seewesen der Griechen und Römer, 1890, p. 10.

[2] *Plin.* Nat. hist., xvi., 74; *Brosius*, iv, 7; *Polyb.*, i, 38, 5f.; *Cæs.* Bell., civ. i, 36; *Assmann*, Antike Schiffe, p. 1600.

[3] Communicated by Prof. Dr. F. Buchenau, through the courtesy of Dr. M. Lindemann, Bremen, April 25, 1892.

[4] *Pliny:* Hist. Nat. xvi, c. 76.

[5] *Tacit:* Annal. xi, c. 18.

In 70 A. D.,[1] on occasion of the Batavian and Frisian revolt under Claudius Civilis against the Roman Government, the Roman Brittanic fleet was attacked and the majority of the vessels sunk—the character of the aggressive force, however, is but approximately known—and after having taken the greater portion of the Roman fleet the enemy's admiral manned the biremen and other vessels, together with a large number of vessels holding from thirty to forty men.[2]

Although still only dug-outs, the art of ship-building appears to have progressed so as to include structures carrying forty men, and moreover to embody in their construction the observations made in the ships of more progressive nations, by allowing ribs to remain for the purpose of additionally strengthening the sides of the ship, or, in other cases, by inserting ribs after the excavation of the tree had been completed. This progressive idea was accompanied by the abandonment of a flat bottom, a rudimentary keel being worked out.

Of this type of naval structures a number of specimens are known to exist, of which one, now in the museum at Kiel, was, in 1878, discovered in the Valermoor, a marsh in Schleswig-Holstein.[3]

The Valermoor boat measures 12.288 meters (41 feet) in length, by 1.30 meters (4.33 feet) greatest width, 57 centimeters (19 inches) internal depth, and 62 centimeters (20½ inches) external height. The thickness of plank is 5 centimeters (1½ inches) at the bottom and 4 centimeters (1¼ inches) on top. The boat had eleven ribs of which nine still exist. Upon the gunwale, between the ribs, eleven holes were excavated for the insertion of the oars; stem and stern are sharp. A keel of (2 meters) 6½ feet in length is worked out of the wood at both ends of the boat, leaving the middle flat. A very interesting prehistoric repair is noticeable in the closing of a crack by means of dovetailed cleats or wedges ("securiculæ" Vitruvius).

The same form is met with in the British Islands.

Ancient boat found at Brigg, Lincolnshire, England[4] (Plate LXVIII). In May, 1886, workmen engaged in an excavation for a new gasometer in the town of Brigg, or more properly Glandford Bridge, Lincoln-

[1] *Tacit:* Hist. iv, 79.

[2] *Tacit:* Hist. v. 23.

[3] *H. Handelmann*, 35te Bericht zur Alterthumskunde Schleswig Holsteins. Kiel, 1878.

[4] *Stevenson, William:* Ancient boat recently discovered near Brigg, Lincolnshire; in Illustrated London News, May 8, 1886. *Brock, L. P. Loftus:* The discovery of an ancient ship at Brigg, Lincolnshire; in Proceedings British Archæolog. Assoc. Meeting, May 19, 1886, p. 279. *Thropp, James:* The prehistoric boat discovered at Brigg; read before the Lincoln and Nottingham Archælog. Soc., June, 1886. *Stevenson William:* The prehistoric boat; in Grimsby News, July 7, 1886. *The ancient boat at Brigg;* in "The Builder," London, July 17, 1886. *Stevenson, William:* Discovery of an ancient British vessel or ship of extraordinary size in Lincolnshire; in The Times, London, August 24, 1886. *Stevenson, William*, unpublished letters. *Atkinson, Alfred:* On the ancient Brigg boat; in Vol. I, Archaeologia (Society of Antiquaries, London).

shire, England, upon the banks of River Ancholme and about 9 miles south of its juncture with the Humber, came upon a huge log which upon examination revealed itself to be an enormous boat, which had found a resting place upon what appears to be the clayey bottom of the sloping beach of an ancient lagoon, the clay, as it accumulated, creeping into every crevice and gradually covering up the entire boat to a depth of 5½ feet below the modern surface level at the bow, and 9 feet at the stern (Pl. LXIX).

The boat is made out of the trunk of an oak tree, perfectly straight, as if turned in a lathe; it is 48 feet 8 inches long, 5 feet wide, and 2 feet 9 inches deep. The stern end represents the butt end of the tree, with a diameter of 5 feet 3 inches; the dimensions, of course, slightly

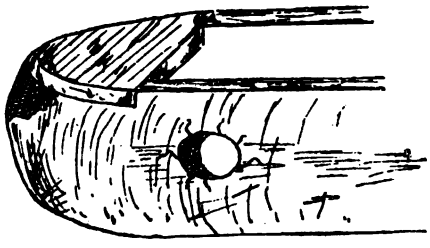


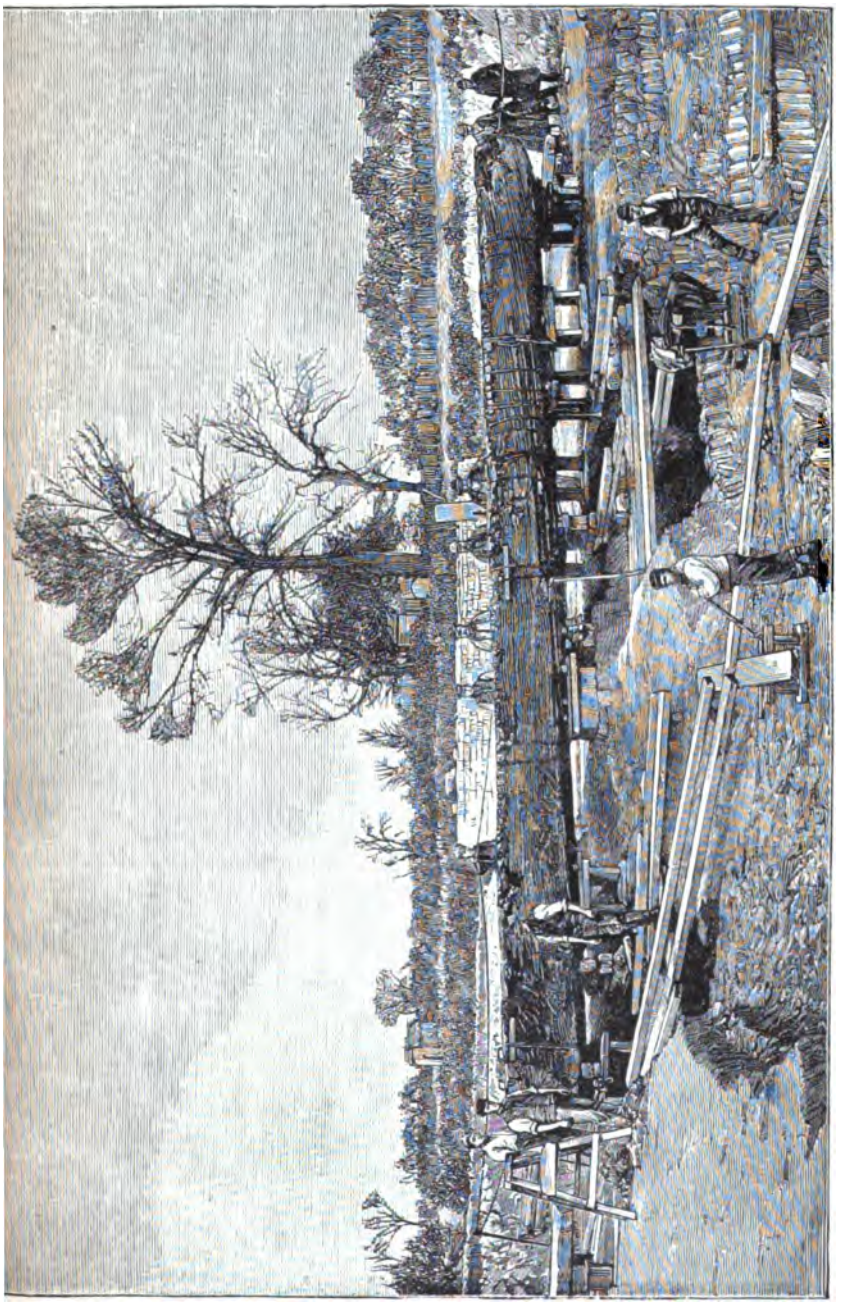
Fig. 25.
PROW OF BRIGG BOAT.
(Drawing furnished by Mr. William Stevenson, of Hull, England.)

diminish towards the prow, which is 4 feet 4 inches, the boat representing about 700 cubic feet contents. In a tree standing, from 4 to 6 inches should be added for bark and sapwood. This would indicate an enormous tree, with a height of about 50 feet to the first branches, that are noticeable on the sides of the prow, which is rounded off as if intended for a ram (Fig. 25).

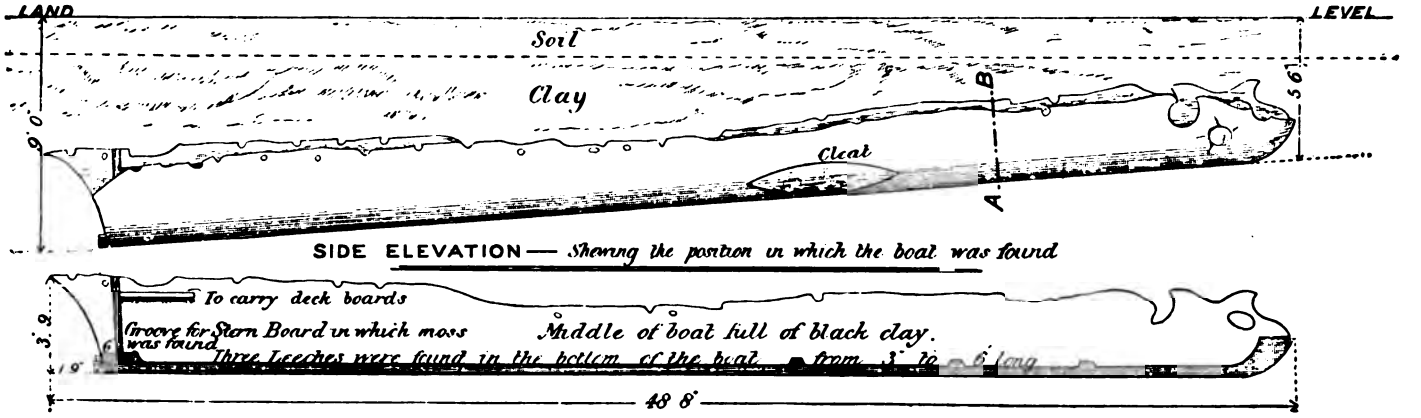
Fig. 26.
CAVITY IN PROW.
(Drawing furnished by Mr. William Stevenson, of Hull, England.)

Fig. 27.
BOWSPRIT (?) OF BRIGG BOAT.
(From Mr. James Thropp's report.)

A cavity in the head of the prow (Fig. 26) is supposed to have been intended for the reception of the bowsprit (Fig. 27), for which a piece of crooked oak found near the prow has been taken. In the absence of a mast, or any arrangement which would point to the propulsion of the craft by means of sails, however, such a theory is untenable, notwithstanding the approximate correspondence in diameter of the curved piece of wood with that of the hole. This cavity (Fig. 26) rather appears to have been the result of the hollow of the tree running up there, *i. e.*, up the main stem. The adjoining parts of the prow are cut down on the top



BOAT FOUND AT BRIGG, LINCOLNSHIRE ENGLAND.
(Copied from the "London Illustrated News," May 8, 1886.)



BOAT FOUND AT BRIGG, LINCOLNSHIRE, ENGLAND.
(Copied from Report of Mr. James Thropp, May 19, 1886.)

so as to form a ledge to receive a board, which may have been the parent of the later forecastle, and which in part served to close the hole on its open side.

Upon the sides of the stem two round holes had existed, which were closed by means of large circular plugs rounded off on the outer face in the form of a boss driven in after the manner of bungs in barrels. The holes may have been designed to represent the eyes of the warship (*ὀφθαλμοί*), which, as *ἀποτρόπαια* in ancient Greek war-vessels, are supposed to be the symbolic significance of precaution against dangers threatening the ship. It is, however, probable that at that point the tree sent out two arms, which were dressed inside and closed up in the manner described, the holes showing the grain of the wood running in the direction of the branches, which of course could not possibly be the case had they been pierced artificially.

The bottom is flat throughout the entire length; the keel, if it may so be called, at the stern, is splitting, possibly owing to the great strain, to which it was subjected in the course of removal, or to shrinkage.

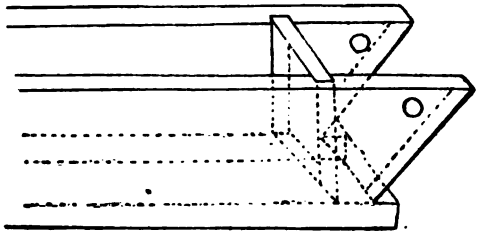


Fig. 28.
OVERHANGING COUNTER.
(Drawing furnished by Mr. Stevenson.)

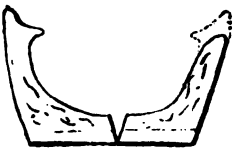


Fig. 29.
FACE OF STERN IN BRIGG BOAT.
(From report of James Thropp.)

The floor is perfectly flat, but in excavating transverse stays were allowed to stand at intervals at right angles to the sides, crossing the bottom athwart ship. Of these ribs, which take the place of floor-timbers in modern craft and are intended to stiffen the structure, three remain in perfect condition. Additional strength is given to stem and stern by allowing a greater thickness of solid wood to remain in shaping the inside of the boat.

The sides are hewn quite perpendicular; at the stern they are cut obliquely, so as to form an overhanging counter (Fig. 28).

As previously stated, the butt end of the tree formed the stern end of the boat, and here, probably on account of the decayed condition of the interior close to the roots, a natural stern could not be provided, and a plank end was adopted, which was fitted to a groove cut down on each side and across the bottom some distance from the end of the tree (Fig. 29). The sides projecting beyond the plank end were cut obliquely up from the bottom and a hole was pierced at each extremity through which probably ropes or thongs were tightly drawn, or sticks

were passed, which by means of wedges or pins held the sides taut against the plank end (Fig. 30).

The stern board (Fig. 31) is of oak planking 1½ inches thick and 4 feet in length, and consists of two boards, one of which is 17 inches wide and the other 10 inches, the sides and bottom having been shaped to

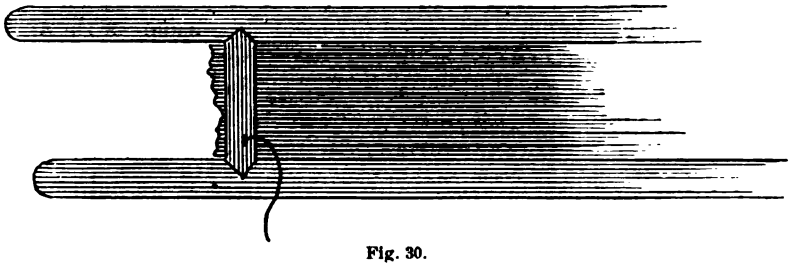


Fig. 30.
STERN OF BRIGG BOAT.
(Drawing furnished by Mr. William Stevenson, of Hull, England.)

fit the grooving. Some caulking found in the groove proved to be moss, which it is supposed was forced into the joint in a dry state, so as to swell and become tight when it got wet. The manner of fastening the stern board is shown in the accompanying figure 32.

Although no traces of deck were found, it is possible that the ledges

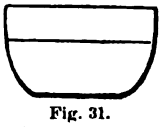


Fig. 31.
STERNBOARD.
(From report of James Thropp, Esq.)

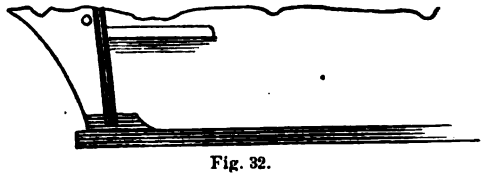


Fig. 32.
GROOVE FOR STERNBOARD.
(From report of James Thropp, Esq.)

cut out of the wood in the stem and forward of the stern-board groove formed the brackets for the support of seats or decks of small dimensions.

Along the sides of the vessel near the top edges are holes from 4 to 6 inches in diameter and chiefly elliptical in shape, which being in the middle portion of the ship and notwithstanding their apparent small dimen-

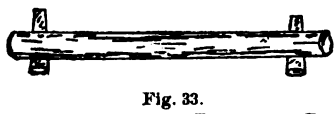


Fig. 33.

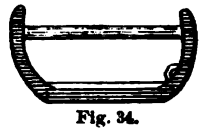


Fig. 34.

TRANSVERSE BARS IN BRIGG BOAT.
(Drawings furnished by Mr. William Stevenson, of Hull, England.)

sions, may possibly have served for oars. It has been suggested that they were intended for a like purpose as the holes in the prolongations of the stern ends, that is, for lashing the sides together and keeping them firmly pressed against transverse stays (Figs. 33 and 34) or stretchers, of which one was found between the gunwales and near a

pair of holes. This stretcher or thwart was not made of oak, but of some softer wood which fell to pieces when removed. It is evident that by such process the sides of the boat would be better enabled to stand additional external pressure and would be prevented from closing in, while in the lashing the stretcher would find a firm and unyielding support against the sides; yet, in the absence of any mast or other indications that the craft was intended for sailing, it may not seem unreasonable to assume that the holes were intended for oar ports and that, judging from analogy with similar structures, the mode of propulsion was by means of oars plied from movable seats lashed to the sides of the ship.

In the angle of junction of the sides and the bottom a peculiar repair is noticeable which, in making good either a defect in the oak or a subsequent damage, indicates an advanced knowledge of carpentry (Figs. 35, 36, 37).

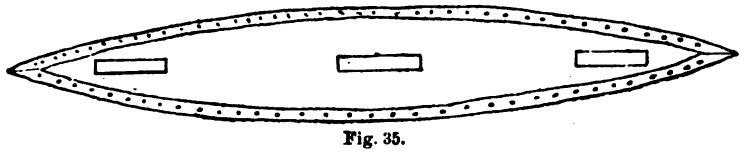


Fig. 35.

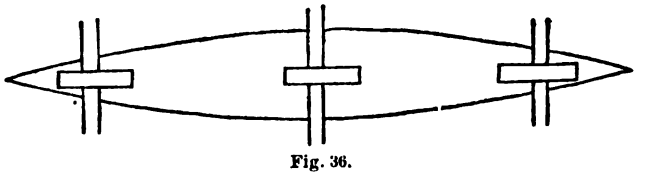


Fig. 36.

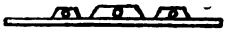


Fig. 37.

PREHISTORIC REPAIR IN BRIGG BOAT.

(Drawings furnished by Mr. William Stevenson, of Hull, England.)

This repair is shown by a cleat 6 feet long and 14 inches wide, tapered at the ends and fixed to the wound on the starboard side of the boat. The cleat is cut out of a solid piece of wood, the edges are beveled and bored through at distances of about 1½ inches and laced or stitched through the boat's side with thongs of hide or leather; three studs are left standing, which pass through the side of the craft and receive, through circular holes cut through them, wedges or pins to "bring the cleat home" and secure a perfectly water-tight joint.

With regard to the antiquity of the ship various factors will have to be taken into consideration.

The River Ancholme, in a tortuous course, drains a district of considerable extent, the "Ancholme Level," which forms a low-lying valley, and although not now of great importance for commercial purposes which are much better served by the "New Ancholme Navigation"

(Fig. 38), a navigable canal for the drainage and reclamation of the Ancholme Level, there are indications that at some early day the river was of much greater extent and importance, forming the drainage of a broad lagoon or swamp, which upon a drift bottom gradually accumulated alluvial deposit, interspersed with remains of fresh-water vegetation, the age of which may be roughly estimated from the existence of two well defined forest beds in the Ancholme Level, one just below the surface, and the other formed in the alluvial clay that collected upon and between the bowlders left at the close of the glacial period, both consisting of peat with large quantities of well preserved remains of oak, yew, hazel, etc.

The ancient lagoon was bordered on the east and west by two well-defined ranges of hills, which contracted in the vicinity of the present Brigg, and there afforded the people of remote antiquity the only

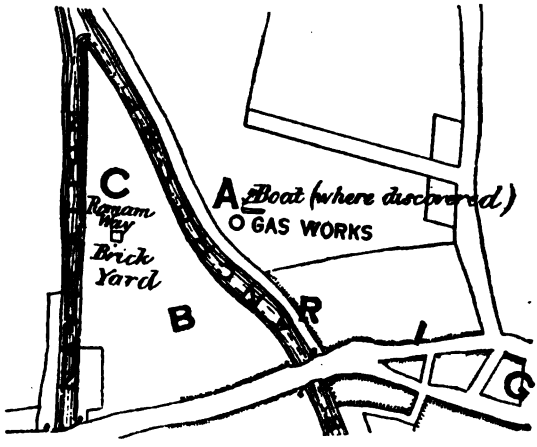
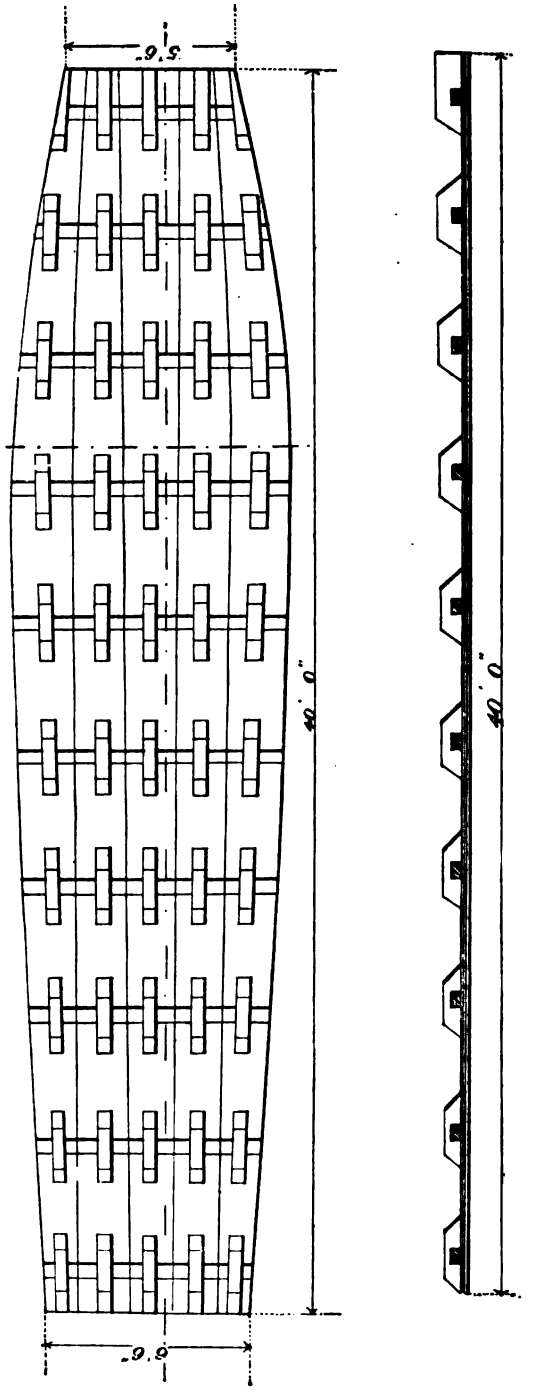


Fig. 38.
LOCATION OF BOAT AND PLANK WAY.

means of crossing this otherwise impenetrable morass. The first record of any attempt to drain this marsh dates back to the reign of Edward I. It was reported to Edward II that "Man and Cattel passing over Glaunford Bridge in the time of flouds were seldom out of danger," and until the middle of the present century when the drainage of the district was improved, the level was under water for several months each year.

It was at this place then, that, in 1884, a most interesting discovery was made, consisting of a *Plank Road* situated 6 feet below the present level, and consisting of oaken planks riven from the tree, about 15 feet in length, and varying in width from 9 to 16 inches, fastened side by side and placed with the straight side up, upon small trees and branches laid at right angles to the planks. The latter were secured by means of stakes or round pieces of wood 3 or 4 inches in diameter, driven through rudely mortised square holes into a bed of stone rubble under-



RAFT FOUND NEAR BRIGG, LINCOLNSHIRE, ENGLAND.
(Copied from Report of Mr. James Thropp.)

a stratum of clay of 6 inches thickness in which were found a jaw bone, a ferule-shaped bone, (which, according to Dr. John , much resembles some object from the Swiss lake dwellings) a celt, some rude pottery, and bones of deer, ox, sheep, and dog.
ve the road is 3 feet of dark gray alluvial clay, containing frag- and remains of sedges and fresh-water plants, and underlying of brown alluvial clay and 1 foot of peat and surface soil.
at 120 yards north of this causeway, lying at an angle of 53 s and 90 yards south of the junction of the old Ancholme River ne New Ancholme Navigation (Fig. 39), a unique structure was consisting of a *Raft*[1] (Plate LXX) buried 2½ feet below the present t the fore end, and 3½ feet at the aft end, having a length of 40 / 6½ feet at the fore end and 5½ feet at the aft end.

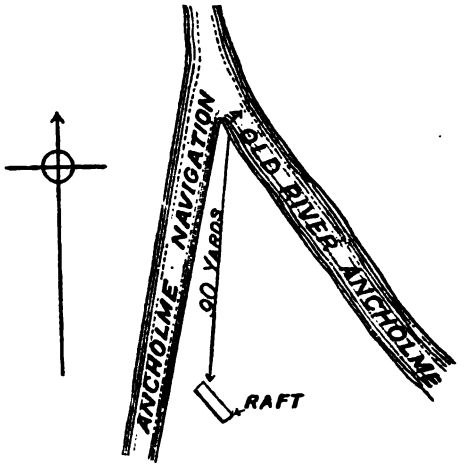


Fig. 39.
Location of Raft.

level bottom consists of five boards tapering at the ends and enting the heart wood of trees split in the middle, with the re- er cut down but leaving the cleats in the solid at intervals in el rows. The cleats at the extreme ends were finished flush with nks and all were provided with mortised holes to receive trans- or tie bars, consisting of rough branches of trees. Ten such tie- assing through the holes were secured by wedges driven in at les of the raft and also in the middle row of cleats to keep the g taut.
joints were caulked with moss and the sides of each plank were l with three-eighths-inch holes, 2 to 3 inches apart, and the

scription of an ancient raft recently found by Messrs. Judge and Cole, in a joining the brickyard, in their occupation, belonging to the Right Honor- e Earl of Yarborough, situate at Brigg, in the county of Lincoln, by J. , Assoc. M. Inst. C. E., county surveyor, Lincoln.

joints covered with straight pieces of wood 2 inches in diameter, fastened by lashing, which was passed through the holes and over these round packing pieces.

Owing to the peculiar manner of construction and method of tying the planking and framing together, and leaving solid cleats in the planks, speculation has connected this raft with the Viking ships of Tune and Gokstad, in Norway. This method, however, is not confined to the naval structures of the eighth to the tenth century, but also occurs in the boat of the third century found in Nydam Moss, Denmark, from the description of which, by Engelhardt[1] we learn that "on all the planks there are perforated clamps of one and the same piece with the planks themselves, having been left projecting when the planks were cut out of the solid timber, and the ribs had perforations corresponding to the clamps, through which bast ropes were passed, tying planks and ribs together.

Nor does it stop here; but the same arrangement occurs in the repairs shown in the ancient boat found in the vicinity of the raft, and in a canoe of the identical type found at Valermoor, Denmark, and now in the museum at Kiel,[2] thus suggesting a common origin for those objects now under consideration.

In point of type these boats correspond to those ascribed by Tacitus in 70 A. D.[3] to the Batavians and Frisians, and although it is possible that the Romans would have employed such craft in crossing from Gaul to Great Britain, it is safe to assume that the same mode of construction may have been employed by the contemporaries in Britain. In point of antiquity, the position of the boat, raft, and planking, relatively to the geological formation does not necessarily connect them with the period expressed by the glacial drift upon or in the immediate vicinity of which they have found their last resting place, since even in historic times Glanford Brigg, now 9 miles from the Humber, was known as a fishing hamlet. This points to a more ready communication with the open water than at present, the intervening space having gradually filled up with deposits, the soft nature of which would cause the heavy objects, by their own weight, to find a lower level than the one corresponding to the period to which they properly belong, that of the Roman invasion, relics of which are found among the upper layer of forest land underlying the modern surface land.

A third specimen of this type is that known as the

Loch Arthur Boat[4] (Plate LXXI), found by Mr. Pittendjeon of Cargen, Dumfries, Scotland, in the summer of 1876 in Lotus Loch, or Loch Arthur, about 6 miles west of Dumfries.

[1] *Engelhardt, C.:* Denmark in the Early Iron Age, London, 1866.

[2] *Handelmann H.:* 35te Bericht zur Alterthumskunde Schleswig-Holsteins. Kiel. 1878.

[3] *Tacitus.* Hist. v, 23.

[4] *Pittendjeon, Mr.:* Unpublished letter of April 26, 1886, to Mr. Wm. Stevenson, and communicated by him to the author.

BOAT FOUND IN LOCH ARTHUR, SCOTLAND.
(Photographed from a sketch by Professor Geikie, Director of the Geological Survey of Scotland.)

The canoe was 42 feet long, dug out of oak; its width and breadth correspond to that of Brigg, with which it has great similarity. The grooves at the stern end were quite distinct where the board had been fitted in; the most remarkable feature in this canoe is the prow, which is shaped like the head of an animal.

About one-third of this boat, the front part, is now in the museum of the Antiquarian Society of Edinburgh; the aft end was so much broken after having been exposed to the air for some time that it was not worth preserving.

The photograph was made from a sketch made on the spot by Prof. James Geikie, of the Geological Survey.

This type finds numerous representatives in the British Isles. In and about Glasgow alone more than twenty canoes have been discovered and exhumed at various times.[1] They were met with at different depths, ranging from 10 to 20 feet below the present surface of the land, in strata of sand, gravel, and clay that indicate marine conditions for these deposits over the broad estuary of the Clyde, on which Glasgow is now built. Marine shells have been found in the strata surrounding the canoes as well as attached to their wood.[2]

Five of these boats lay buried in silt under the streets of Glasgow, one in a vertical position with the prow uppermost, as if it had sunk in a storm. Twelve other canoes were found about 100 yards back from the river at the average depth of about 19 feet from the surface of the soil, or 7 feet above high-water mark, but a few of them were only 4 or 5 feet deep, and consequently more than 20 feet above the sea level. One was sticking in the sand at an angle of 45 degrees, another had been capsized and lay bottom uppermost; all the rest were in horizontal positions, as if they had sunk in smooth water.[3]

Nearly all of these boats were formed out of a single oak stem, hollowed out by blunt tools; some were cut smooth, evidently with metallic tools. Hence a gradation could be traced from a pattern of extreme rudeness to one showing no small mechanical ingenuity. Two of them

[1] *Geikie, James:* The Great Ice Age; London, 1874, p. 212. *Biliotheca Topog. Brit.;* No. 2, Part III, p. 242. *Beauties of Scotland;* Vol. III, p. 419. *Chapman, R.:* Picture of Glasgow; p. 152. *Chambers, R.:* Ancient Sea Margins; pp. 18, 158, 203-209. *Buchanan, John:* Glasgow Past and Present; 1856. *Geological Society of Glasgow,* Transactions; Vol. III, p. 370. *Nimmo:* History of Stirlingshire; 2d edition, p. 74. *New Statistical Account of Scotland:* Article Errol; also Vol. VI, p. 601. *Davis, J. W.:* Geology of Tremadoc, Carnarvonshire; in Quarterly Journal of Geological Society, May, 1846. *Gentleman's Magazine. Stuart Rob:* Views and Notices of Glasgow in Former Times. *Old England. Glasgow Delineated;* 1826. *Currie, Alex.:* In Proc. Geolog. Soc. Glasgow; Vol. III, pt. 2, p. 370. *British Assoc. Adv. Sci.;* Report 1858, p. 80. *Lyell, Sir Charles:* Antiq. of Man; 1st edition, p. 48. *Macgeorge, A.:* Old Glasgow; 1880, p. 250. *Buchanan, J.:* Ancient Canoes found at Glasgow; in Brit. Assoc. Rep., 1858. *Geikie, James:* Geol. Quart. Journ., Vol. XVIII, p. 224; 1862.

[2] *Chambers, R.:* Ancient Sea Margins; Jordan Hill: Mem. Wern. Soc., Vol. VIII, 1884.

[3] *Buchanan, J.,* in Brit. Assoc. Rep., 1858, p. 80; Glasgow, Past and Present, 1856.

were built of planks, one of which, dug up in 1853, was elaborately constructed.[1] Its prow resembled the beak of an ancient galley, the stern was formed of a triangular piece of oak, oak pins and metallic nails had been used in fastening the planks to the ribs, and for caulking wool dipped in tar had been employed.[2]

This boat was lying keel uppermost with the prow pointing straight up the river. In one of the canoes a beautifully polished celt of greenstone was found. In the bottom of another a hole had been closed by means of a plug of cork,[3] which, as Mr. Geikie remarks, "could only have come from the latitudes of Spain, southern France, or Italy."[4]

Judging, then, from their construction, these vessels represent various archæological periods, namely, the most primitive ones the Stone age, the more finished the Bronze age, and the regularly built boats the Iron age, and their occurrence in one and the same marine formation must be considered as being due to the changes going on continually in the beds of all large bodies of water by the shifting of the channel, deposition, removal, and redeposition of sediments. In determining relative data attention should be paid to the stratification of the alluvium in which the objects occur.

The necessity of pursuing this course is pointed out by Prof. Geikie, as follows:[5]

"The relative position in the silt from which the canoes were exhumed could help us little in any attempt to ascertain their relative ages, unless they had been found vertically above each other. The varying depths of an estuary, its banks of silt and sand, the set of its currents, and the influence of its tides in scouring out alluvium from some parts of its bottom and redepositing it in others are circumstances which require to be taken into account in all such calculations. Mere coincidence of depth from the present surface of the ground, which is tolerably uniform in level, by no means necessarily proves contemporaneous deposition, nor would such an inference follow even from the occurrence of the remains in distant parts of the very same stratum. A canoe might be capsized and sent to the bottom just beneath low water mark; another might experience a similar fate on the following day, but in the middle of the channel. Both would become silted up on the floor of the estuary; but as that floor would be perhaps 20 feet deeper in the center than toward the margin of the river, the one canoe might actually be 20 feet deeper in the alluvium than the other, and on the upheaval of the alluvial deposit, if we were to argue merely from the depth at which the remains were imbedded, we should pronounce the canoe found at the one locality to be immensely older than the other,

[1] *Lyell, Charles,* Antiq. of Man, 1st ed., p. 48.
[2] *Chambers, R.,* Ancient Sea Margins, p. 205.
[3] *Lyell, Charles,* Antiq. of Man, 1st ed., p. 48.
[4] *Geikie, James,* Geol. Quart. Jour., vol. XVIII, p. 224.
[5] *Geikie, James,* Geol. Quart. Jour., vol. XVIII, p. 224.

seeing that the fine mud of the estuary is deposited very slowly, and that it must therefore have taken a long period to form so great a thickness as 20 feet. Again, the tides and currents of the estuary, by changing their direction, might sweep away a considerable mass of alluvium from the bottom, laying bare a canoe that may have foundered many centuries before. After the lapse of so long an interval another vessel might go to the bottom in the same locality, and be there covered up with the older one on the same general plane. These two vessels, found in such a position, would naturally be classed together as of the same age, and yet it is demonstrable that a very long period may have elapsed between the date of the one and that of the other. Such an association of these canoes, therefore, can not be regarded as proving synchronous deposition; nor, on the other hand, can we affirm any difference of age from mere relative position, unless we see one canoe actually buried beneath another."

The positions of these canoes in the ancient estuary of the Clyde, then, would seem to indicate that a rise of the land in Scotland of at least 25 feet above the present level of the sea must have taken place, and while it is generally conceded that this elevation has occurred since the peopling of the island, a much more remote period is assigned to the event than is warranted from the indications of a considerable change of level even in comparatively recent times.

Thus a recess in the face of the alluvium of Carron River, below Larbert Bridge, in Stirlingshire, is spoken of by tradition as an ancient harbor, and the remains of a boat and a broken anchor have been found imbedded in the spot.[1]

According to Nimmo[2], the Carse of Stirling was cultivated and measured in the twelfth century, and it is quoted from Trevelius' Chronicle that during the invasion of Scotland by Edward I, the English cavalry could not make their way through these "Loca Palustria" in the winter season.

An indirect support is given by Robert Chambers, from whose writing[3] I quote:

"The few remnants of a higher plateau throughout the Carse of Gowrie almost all bear names in which the Celtic word for island (*inch*) forms a part; as if a primitive people had originally recognized these as islands in the midst of a shallow firth. Perhaps there is little consequence to be attached to this fact since the extreme wetness which, even in recent times pertained to the lowlands of the Carse, may have appeared a sufficient reason for so distinguishing any snatch of more elevated and firmer ground. The minister of Errol reports, unfortunately not in a direct way, the finding of the remains of a small anchor, about fifty years ago, on a piece of low ground on the estate of Mag-

[1] *Chambers, R.*, Ancient Sea Margins, p. 158.

[2] Nimmo's History of Stirlingshire, 2d ed., p. 74.

[3] *Chambers, R.*, Ancient Sea Margins, p. 18.

ginch. In the same district, which is fully a mile from the margin of the firth, a boat hook was discovered, 18 feet below the surface, 'sticking' among the gravel, as if left by the tide on the seashore.[1] (Here and for what follows, I quote a letter from a lady, the daughter of one of the chief proprietors of the Carse.) 'This relic has been preserved by the farmer who found it. I am also assured that what was considered as the remains of an anchor was found some years ago in casting a drain below Flaw Craig, a cliff which overlooks the Carse between Kinnaird and Fingask. Time out of mind, it has been a popular belief in this district that Flaw Craig rock bore the remains of a ring to which ships were fastened when the sea ran at the bottom of the hill.' A man living a few years ago alleged that he had seen the iron ring in his youth as he climbed along the face of the crag in bird nesting. So also it is told that the rock upon which Castle Huntly stands, in the center of the Carse, once had rings fixed to it for mooring the boats formerly used in sailing over the surrounding waters. A circumstance in the title deeds of at least one estate on the slopes descending to the Carse has given more force to these popular beliefs in the minds of the educated classes, namely, that they include a right of salmon fishing, though the lands are separated from the firth by the whole breadth of the Carse."

These particulars would perhaps not be deserving of notice if they were not in conformity with some others that are better authenticated. According to Mr. J. E. Davis,[2] "the sea is embanked out from an inlet called Traeth Mawr, in Carvonshire. There are a series of embankments higher up, which were made in the sixteenth century. It is evident that these embankments are not the sole or the principal cause of the sea no longer flowing within them, but that the natural recession of the sea (or elevation of the land) induced the inhabitants to anticipate, by the erection of earthen mounds, that which would have been produced in a few years by other causes. The sea marks may be traced upon the surface of the escarpments in several of the islands of the Tremadoc Valley, many feet above the present level of high water. Tradition also lends its aid. From the rocky ground of Inshir, Madoc, one of the princes of North Wales, leaving his country, sailed to unknown lands. And to descend to more recent times, I was informed that the parish register at Penmorfa contains entries showing that a place in the parish called Yevern was once a seaport, which, immediately before the erection of the great embankment, was several feet above high water."

In the great charter granted to the monastery of Holyrood (A. D. 1143) the King conveys to the monks at Renfrew "unum tostum in reinfry" with a right not only of nets "ad salmones," but, "et *ibi* piscari ad al-

[1] *Chambers, R.*, Ancient Sea Margins, p. 18.

[2] *Davis, J. E.* On Geology of Tremadoc, Carnarvonshire. In Quarterly Journal of Geological Society. May 1846.

lechtia libere,"[1] and in the reign of Malcolm Ceanmor "Renfriu" was entered with a large fleet.[2]

In 1683, while digging a water gate for a mill in the town of Stranrawer, the workmen came upon a ship *a considerable distance from the shore, into which the sea, at the highest spring tide, never comes.* "It was lying transversely under a little bourn, and wholly covered with earth a considerable depth; for there was a good yard, with kail growing in it, upon the one end of it. But that part of it which was gotten out, my informer, who saw it, conjecture that it had been pretty large; they also tell me that the boards were not joined together after the present fashion, but that it had nails of copper."[3] The remains were left *in situ*, and while the given account is rather meager, the use of copper nails would indicate considerable antiquity.

In reviewing the whole evidence, geological and archæological, afforded by the Scottish coast line, Mr. Lyell[4] concludes that: "The last upheaval of 25 feet took place not only since the first human population settled in the island, but long after metallic implements had come into use; and there even seems a strong presumption in favor of the opinion that the date of the elevation may have been subsequent to the Roman invasion."

In some of the boats found at Glasgow,[5] and in one discovered in 1834 in the creek of river Arun, near North Stoke, Sussex,[6] the stern board arrangement, fully described and figured in a preceding chapter, on the boat found at Brigg, Lincolnshire, is noticeable, and other features in their construction connect them intimately with those of Loch Arthur, Scotland, Valermoor, Denmark, and with the crafts ascribed by Tacitus[7] to the Batavians and Frisians in their revolt, in A. D. 70, against the Roman Government.

THE SAXONS.

The next tribe assuming maritime supremacy in the Northern seas are the Saxons, who, according to their own lore,[8] claim vassalship under

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[1] Liber Cartarum Sancte Crucis, p. 5.

[2] Chron. Manniæ in Mr. Skene's Celtic Scotland, Vol. I, p. 473; quoted by Macgeorge, Old Glasgow, 1880, p. 261.

[3] *Kennedy, Alexander:* Notice respecting an ancient ship discovered in a garden at Stranrawer, in Galloway. (In "Archæologia Scotica," Vol. III, Edinburgh, 1828.) The notice was copied from a manuscript account of the bishopric of Galloway in the possession of Thomas Goldie, esq., of Dumfries, supposed to be a copy of the "Description of Galloway," written by Andrew Symson, minister of Kirkinnes, in the year 1684, of which an elegant and correct edition has been recently printed for the first time from a manuscript copy revised and enlarged by the author in 1692.

[4] *Lyell, Charles:* Antiquity of Man.

[5] *Chambers, R.:* Ancient Sea Margins, p. 205.

[6] *E. P. Loftus Brock* in Proc. Brit. Arch. Assoc., May 19, 1886.

[7] *Tacit.* Hist., IV, c. 79.

[8] *Grimm,* deutsche Sagen, I, 408. *Dresser,* Sachsenchronik, p. 7–8. *Annolied* (XII Cent), 21, 230. Sachsenspiegel, III, 44, 2, 3.

Alexander the Great. Upon his death they took to their ships, and finally effected a landing at the mouth of the river Elbe, where, on account of their long knives—by the Thuringians, whom they subjugated,[1] called "Sahs"—the name Saxe or Saxon was adopted. The term "sax" for a single-edged sword occurs in the Northern sagas,[2] in which also a Saxland is mentioned, a country situated east of the peninsula of Jutland.

At the beginning of the Christian era they are reported to have occupied the land north of the river Elbe;[3] in A. D. 140 they are still found in the same location,[4] and near neighbors to the Angli; in the middle of the third century they are supposed to be coterminous with the Chauci;[5] in the middle of the fourth century with the Franks;[6] and about that time (363) they attempted settlement in Brittany.[7]

They are said to have possessed the art of sailing by the wind (tacking) and their small, apparently frail vessels, built of willow upon a keel of knotty oak and covered with skins,[8] the whole so light that, entering far into rivers, even with unfavorable wind, they would terrify the inhabitants of the Roman coast.[9] Notwithstanding their limited knowledge of the stars, without compass, without charts they found their way to the Orkneys.[10]

In the times of Diocletian and Maximian the Saxons harassed the coasts of Gallia and Brittany to such an extent that Maximian, in 286, was obliged to convert Gesoriacum, or Bononia (Boulogne), into a port for the Roman fleet.[11]

During the revolt of Carausius against the Roman Government, the confederate Saxons, etc., built ships after the Roman model, learned

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[1] Curiosa Sax., 1768, pp 210, 233, 342. *Witechindus* Corb, c. 3. *Horndorf*, Promt. exempl., p. 277.

[2] *Grettir Saga.* "When Grettir saw that the young man was within reach, he lifted his *sax* high in the air and struck Arnor's head with its back, so that his head was broken and he died. Thereupon he killed the father with his *sax*."

[3] *Vellejus Paterculus*, 2, c. 107.

[4] *Ptolemy*—Geog. lib., ii, c. 2. "Επι τον αυχενα της Κιμβρικης Χερδονησου Σαξονες"

[5] *Pliny* Hist. Nat. XVI, c. 76. *Dr. Gustav Klemm*, Handbuch der Germanischen Alterthumskunde, 1836. *S. Barth*, Teutschland's Urgeschichte.

[6] *Eutrop.* Breviar. Hist. IX, c. 21. *Aurel.* Vict. in Caes. c. 32. Eumenius I. c. 12. *Ammianus Marcel.* Rer. Gestar. lib. XXVI, sec. 4; lib. XXVII, c. 8, sec. 5.

[7] *Claudius* IV; Consul Honor I. 31, 32.

[8] *S. Barth*, Teutschland's Urgeschichte II, 288. Ziulae, anglo saxon Ceol. Isidor origines LXIX, v. I, Celones. Icelandic Kiolur, Low German, Yell. *Dr. G. Klemm.* Handb. d. Germ. Alterthk. 1836, p. 148. *Sidonius Appolinaris* Carus VII, v. 370.

"Quin et aremoricus pyratam Saxona tractus
Sperabat, cui pelle salum sulcare Britannum
Ludus, et assuto glaucum mare findere lembo."

[9] In *Claudian*, De laudibus Stilich II, v. 254, Britannia says: "Illius effectum curis, ne litore tuto, Prospicerem dubiis venturum Saxona ventis."

[10] *Claudian*, De Cons. Hon. IV, 31: "Maduerunt Saxone fuso Orcades; incaluit Pictorum sanguine Thule; Scotorum cumulus flevit glacialis Ierne."

[11] *Eutropius*, Breviar. Histor. IX, c. 21. Aurel. Vict. in Caes. c. 32.

regular maritime warfare,[1] and occupied Batavian territory until Constantinus Chlorus retook Bononia, built a new fleet, and in 298 conquered the Brittanic Cæsar, and his German allies.[2]

In 363 the Saxon piratical craft again harassed the Gallic coast.[3] It is possible that the Saxons entered into a compact with the Picts, whom they afterwards so successfully fought for that possession, and around the coast of Scotland those naval battles may have been fought which are mentioned by Theodosius' orator,[4] and which freed the ocean from the Saxons.[5] But, notwithstanding, the terror they had spread down to the Garonne and Charente,[6] the destiny of the Saxons was fulfilled in the middle of the fifth century with the landing of Hengist and Horsa upon the southeast shores of Albion, with their three vessels, no longer canoes nor còrakles of willow covered with skins, but long war-vessels, according to ancient tradition, each carrying three hundred men; not longer hollow trunks, but decked with high forecastle and quarterdeck, proofs of the mighty progression.[7]

Nothing definite is known of the precise manner of shipbuilding among the Saxons unless the ship and boats found in the Nydam Moss, in the present Duchy of Sleswick, are accepted as a Saxon model. It has, by many writers, been ascribed to the Danes, near neighbors of the Saxons, and coinhabitants of the peninsula of Jutland.[8] The Saxon claim on this ship is weakened by the fact that it presents exceedingly fine lines denoting greater knowledge of naval construction than can ordinarily be ascribed to a people who, like the Saxons, have occupied a short coast line, and have but for a comparatively brief space of time been engaged in maritime pursuits.

A further doubt as to the nationality of the ship in question arises from the exceedingly sparce and vague knowledge of the Romans, to whom we are indebted for any and all accounts of the North and its people. It will, for instance, be observed that Tacitus, in his Germaniæ, not even mentions the Saxons; a few years later they are reported to have occupied the country adjacent the mouth of the river

[1] *Eumenius* I c. 12.

[2] *Eumenius* I c. 17.

[3] *Claudian* IV, Consul Honor. I, 31, 32.

[4] *Pacatus Drepanius* in Panegyr. upon Theodor. M., c. 5.

[5] *Claudian* in Eutrop. I, v. 392.

[6] *Sidon. Appolin.* Epist. viii, 6.

[7] *Nennii* Histor. Briton., Ed. San Marte, § 31 "tres ciulæ." *Gildas*, de excidio Britan.. Ibid. § 23, "tribus ut lingua (Saxorum) exprimitur, cyuli, nostra lingua longis navibus, secundis velis." *Beda*, Ecclesiast. Histor. gentis Anglor; I, c. 15 (ed. Antwerp, 1550) "tribus longis navibus." *Sharon Turner*, History of the Anglo-Saxons, I, 151 (edit. Paris) "the vessels carried three hundred men each." *Nennius*, etc., § 37, states that Hengist had a reënforcement sent consisting of sixteen additional ciuli.

[8] *Procopius*, de Bello Gothico, lib., 2 c. 15. *Ptolemy*, lib. II, c. ii, speaks of the Δανχιονες or Δαγγιονες as the inhabitants of southern Scania. *Petersen*, Danmarks Historie i. Hedenold. *Worsaæ, J. J. A.*, Zur Alterthumskunde des Nordens. *Keyser, R.*, Om Normändens Herkomst og Folkesläigtskab.

Elbe. Probably it was the same people whose chief rowed across the river in a small dug-out[1] to pay his respects to the Roman conqueror.[2] One of the finest productions of prehistoric naval architecture of a few centuries later is to be ascribed to their skill. Neither its shape nor workmanship suggest the Ciulæ[3] mentioned by all the early writers in connection with the Saxon maritime power; its form is rather suggestive of the ships of the Suiones,[4] which will be fully described in a later chapter, and it will, I think, be safe to accept the opinion of the renowned archæologist Engelhardt,[5] and ascribe the structure to our Scandinavian neighbors rather than to the Germans[6] although the latter now occupy the territory upon which this interesting find has been made.

THE FRANKS.

The first mention in history of the name of Franks is made in a song, which the soldiers of Aurelian, in A. D. 214, just returned from the Northern German frontier, sang when leaving Rome for the Persian war.[7]

Neither Cæsar, Tacitus, nor Ptolemy mention the Franks, although they often speak of the people that occupied the very districts in which we afterwards find the Franks. It is, therefore, probable that Frank is the newest Old German name and represents somewhat vaguely a group of tribes bearing other names, although not much value is placed by some[8] upon this theory.

During the reign of Aurelian they make their first appearance upon the sea, discovering the entrance to the Mediterranean and ransacking Taragone.[9]

In earlier days they dwelt on the right banks of the Rhine, and, as once the Romans pressed on them, ere long they began to press on the Romans in return. The oldest Frankish band was then on the Rhine; southeast was a second group, including the Bructers and others, and beyond these the Chatti and Suevi, to which group[10] the name Franks was first given.

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[1] "Caveatum ut illis mos est ex materia."

[2] *Vellejus Paterculus* II, c. 107.

[3] *S. Barth*, Teutschlands Urgeschichte II, 288. *Isidor* origines lxix, 1. *Dr. G. Klemm*, Handb. d. Germ. Alterth. Kunde, p. 148. *Nennii* Histor. Briton., ed. San Marte, § 31, 37. *Gildas*, de Excidio Britan., *ibid.*, § 23.

[4] *Tacitus*, De Germaniæ, c. xliv.

[5] *Engelhardt, C.*, Denmark in the Early Iron Age, London, 1866.

[6] *Werner, Admiral*, Das Seewesen der Germanischen Vorzeit. *Handelmann*, H. Das älteste Germanische Seeschiff. 1871.

[7] *Vopiscus* in Aureliano, c. 7:

"Mille Sarmatas, Mille Francos, semel et semel occidimus,
Mille, mille, mille, mille, mille Persas quærimus."

[8] *Jacob Grimm:* Geschichte der Deutschen Sprache, p. 518.

[9] *Aurelius* Victor in Cæs., c. 33; *Eutropius*, IX, 6; *Claudius* IV, Cons. Honor, I 31, 32; *Orosius* VII, c. 2; *Nazar* Panegyr., Constant. Aug. dict., c. 17.

[10] *Watterich:* Die Germanen des Rheins, p. 166.

In the middle of the fourth century they are said to be coterminous with the Saxons.[1]

During the reign of Emperor Probus, transported to the Pontus, they seized the ships, and after many adventures returned to their northern homes.[2]

Nothing whatever is known of the character of the vessels employed by the Franks, and after a short existence they again disappear as a maritime power.[3]

THE SCANDINAVIANS.

The first mention of this people of the north is made by Tacitus. In describing the ships of the Suiones, he says: "*Suionem civitates ipsae in oceano praeter viros armaque classibus valent; forma navium et differt quod utriumque prora paratum semper appulsui frontem agit: nec velis ministrant, nec remos in ordinem lateribus adjugunt: solutum, in quibusdam fluminum et mutabile, ut res poscit, hinc vel illinc remigium.*"

In the absence of a specimen great difficulties presented themselves to the translators of Tacitus[4] in correctly interpreting the meaning to be conveyed of the structure of ships that so much differed from the Roman and other ships known as to require separate mention, although they really offered considerable similarity to the ships of the Veneti. Most translators therefore inform us that the equal prows were intended to facilitate landing in either direction and to enable the ship to effect an easy passage through shoals. With regard to the oars the general impression has been that they were not fixed to the sides of the ship in a regular manner *(nec remos in ordinem lateribus adjugunt)* but that they were loose *(solutum)* and could be used alternately *(mutabile)* on either side of the ship *(hinc vel illinc)*.

Admiral Jal[5] explains the *mutabile* as implying a method similar to that employed by the Venetian gondoliers, who use a peg in the gunwale as point of resistance, and on either side of which the oar could be plied to produce a forward or backward motion. This interpretation, although a very good one considering the absence of any ship, however, does not seem to me to represent what Tacitus meant to describe. The *utriumque prora paratum semper appulsui frontem agit* would seem to imply a readiness to present in either prow a front to the enemy, either for aggressive or defensive purposes, and that this front could be

[1] *Ammian.* Marcell. rer. gestar. lib. xxvi, § 4; lib. xxvi, § 5.

[2] *Zosimus* I, c. 7; *Vopiscus* in Probo. IV, c. 18; *Eumenius* in Penegyr. Constant. Cæs., xviii.

[3] The authorities on the Franks are: *Jacob Grimm*: Geschichte der Deutschen Sprache, Leipzig, 1848; *Waitz:* Des alte Recht der Salischen Franken, Beilage zur Deutschen Verfassungsgeschichte, Kiel, 1846; *Bohm:* Fränkische Reichs-und Gerichts Verfassungsgeschichte, Weimar, 1871; *Watterich:* Die Germanes des Rheines, Leipzig, 1872.

[4] *Tacitus*: De Germaniæ c. xliv.

[5] *A. Jal:* Archéologie Navale, 1840, 2d Mémoir.

much easier maintained by the position of the oars which were not fixed *(nec remos in ordinem lateribus adjugunt)*, that is not permanently fixed to the sides of the ship, but were *(solutum)* loosely suspended *(et mutabile)* and capable of being changed in so far as to be employed in either direction *(hinc vel illinc remigium)*; or, in other words, that, although in a measure fixtures to the sides of the ship, yet they were hanging loosely in loops or straps fastened to the rowlocks that, like the rowlocks for a forward motion, would act as points of resistance to permit a backward rowing without change of oar or of rowers.

The next mention of the people of the North we find in the middle of the second century, when the Danes are mentioned as inhabitants of Scania,[1] but it is not until the beginning of the sixth century that the Scandinavians (Danes) announce their coming to the West by entering the river Maas and pillaging the vicinity of Geldern.[2]

A navy of ships of the kind described by Tacitus must necessarily have been the growth of centuries, and must have been the result of active service upon the sea, in accordance with the historical truth that powerful nations do not remain idle; and it is, therefore, to be inferred that the Scandinavians (Suiones of Tacitus, Danes of Prokop) navigated the sea many centuries before the beginning of the Christian era.

The early history of a people finds its beginning in the traditions of the deeds and achievements of prominent men among them that were recounted upon festive occasions and thus handed down from generation to generation. Although based on facts, they soon assumed a mythical character and they do not now admit of being assigned a definite period of origin, while others, becoming more and more vague, were gradually forgotten, a circumstance much regretted by Cicero[3] as regards the loss to history of important facts.

Rock-sculptures.—The oldest form of the tradition of the people of the North has been discovered in the rock sculptures so abundantly found along the Scandinavian coast. They give, in an ideographic form, an account of the important events, a permanent record to be handed down to posterity. A second form, of much more recent date, is presented in the "Sagas."

The rock sculptures have received the name Hellristninger, (or Häll-

[1] *Ptolemy*, lib. ii, c. ii, speaks of the Δαυχιονες or Δαχγιονες. Procop. de bello goth. lib. 2, c. xi, xv. *H. M. Petersen*: Danmarks Historie i Hedenold, i, 24. *Worsaæ, J. J. A.*: Zur Alterthumskunde des Nordens, p. 78. *Keyser, R.*: Om Normändens Herkomst og Folkesägstkab.

[2] Greg. Turon, iii, c. 3. *Barthold:* Geschichte der Deutschen Seemacht (in Ranmer's Histor. Taschenbuch, iii Folge, i Band, 1850, p. 304).

[3] "Gravissimus auctor in 'Originibus' dixit Cato, morem apud majores hunc specularum fuisse, ut deinceps, qui accubarent canerent ad tibiam clarorum vivorum laudes atque virtutes" (*Cic.* Tusc. Quæst. IV, 3). "Utinam existarent illa carmina quæ multio sæculis ante suam ætatem in spulis esse cantitata a singulis convivis declamorum vivorum laudibus in 'Originibus' scriptum reliquit Cato" (*Cic.* Brut. XIX).

ngar,)[1] and among other objects they exhibit, in single outline, or less equipped ships, sharp at the ends, with stem and stern d and high. They occur along the coast from Trondhjem south- and around to and including Gotland. A few have been found nmark and upon the shores of Lake Ladoga in Russia.

th regard to their antiquity a variety of opinions prevail. Bru- assigns them to the stone age and perhaps to the beginning of ronze age; he thinks that they have been produced by rubbing or nering, but that in either case they show the aid of stone utensils. elius,[3] Holmboe,[4] and Montelius[5] place them in the bronze age it 1500 to 500 B. C.),[6] and a similar opinion is entertained by Nico-

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erg, Dr. L.: Hällristningar uti Bohuslän, 1839. Annaler for Nordiske Old- ghed, Kopenhagen, 183, p. 386; 1839, pl. x; 1842–'43, p. 348. Archiv f. An- ologie, x, p. 86. *Baltzer, L.:* Bohusläns Hällristningar, 1881. *Brunius:* Forsök örklaringer öfver Hellristninger, Lund, 1868. *Bruzelius:* Om Hällristningar i tads Härad i Skåne (I Ant. Tidsk. f. Sverige, vi). Bulletin histor. philol. de . des Sci. de St.-Pétersbourg, xii, No. 7, 8. *Du Chaillu:* Viking Age, i, p. 116. *erg, A. E.:* Bohusläns Historie och Beskrifning, Udervalla, 1842, p. 15, 19, pl. *Holmberg, A. E.:* Scandinaviens Hällristningar, Stockholm, 1846. *Holmboe:* elleristninger (I Christ. Vidensk. Selsk. Forh., 1861). *Ferguson:* Rude Stone nents, fig. 106, p. 303. *Grewingk, C.:* Ueber die in Granit geritzten Bilder- en am Onegasee. *Grewingk, C.:* Verh. d. estnischen Ges. zu Dorpat, vii, Heft 5. *Kemble:* Horae ferales, p. 228. *Montelius O.:* Bohusläns Hällristningar, holm. *Montelius, O.:* The Civilization of Sweden in Heathen Times (Transl. H. Woods, London, 1888). *Montelius, O.:* Bohuslänske Fornsaker, Stockholm, . 24–27. *Nilsson, S.:* Die Ureinwohner des Skandinavischen Nordens. *Nico- , N.:* Langskibet fra Gokstad, Kristiania, 1882, p. 9. *Petersen, Dr. Henry:* Om istninger i Danmark (Aarb. nord. Oldkynd, 1875, p. 42). *Petersen, Dr. Henry:* sur les pierres sculptées du Danemark (Transl. by Abbé L. Morillet in Mém. Soc. R. d. Antiq. du Nord, Copenhagen, 1877, p. 330–342). *Petersen, L.:* Mere lleristninger ved Allinge (Meddelse til Bornholm Tid., 30 Sep. 1884). *Rau C.:* haped and other lapidarian sculptures (in Contributions to North American logy, vol. v, U. S. Department of the Interior), Washington. *Rygh, O.:* Om istninger i Norge (Vidensk. Selsk. Krist. Forh., 1873, p. 455–470). *Schwede:* . Iswestija d. Geogr. Ges. St. Petersburg, 1850, p. 68. *Simpson:* Archaic tures, p. 72. *Stevens, Geo.:* Runic Monuments, vol. i, p. 74. *Vedel, E.:* Born- Oldtidsminder og Oldsager, Kjöb., 1886. *Worsaæ, J. J. A.:* Nordiske Oldsager K. Museum, Kjöbenhavn. *Worsaæ, J. J. A.:* The primeval antiquities of Den- (transl. by W. J. Thomas), London, 1849. *Worsaæ, J. J. A.:* The Industrial of Denmark, 1882, p. 113. *Worsaæ, J. J. A.:* Zur Vorgeschichte des Nordens an transl. by J. Mestorf, 1887, p. 67). *Worsaæ, J. J. A.:* Zur Alterthumskunde ordens.

unius: Forsök till Förklaringer öfver Hellristninger, Lund, 1868.

uzelius: Om Hällristningar i Järrestads Härad i Skåne (I, Ant. Tids. f. Sverige,

lmboe: Om Helleristninger (I, Christ. Vidensk. Selsk. Forh., 1861.)

ntelius, O.: The Civilization of Sweden in Heathen Times, London, 1888.

sson, S.: Skandinaviske Nordens Urinvånarne, 1838–1843. *Nilsson, S.:* The tive Inhabitants of Scandinavia, 1868. *Montelius, O.:* The Civilization of n in Heathen Times, London, 1888, p. 70. Compte Rendu du Cong. Archéolog. ckholm, ii, 450. *Montelius, O.:* Om tidsbestämming inom bronsåldern nal sär- af seende pa Skandinavia, Stockholm, 1885, accept the bronze age as having ied the period of *from 1500 to 500* B. C.

laysen,[1] who gives approximately the year 1000 B. C. as the time their origin. Boor Emil Hildebrand[2] places them in the bronze a from the form of weapons represented, while Holmberg[3] credits the to the Vikings; the sculptures of that period, however, distinguis themselves in a remarkable degree from those of the bronze age, shown in the Häggeby stone, in Upland, Sweden, and in the Tjängvid

Fig. 40.

RUNIC STONE FOUND AT TJÄNGVIDE, GOTLAND, SWEDEN.

(Reproduced from Du Chaillu: Land of the Midnight Sun.)

Stone, Alskog parish, Gotland (Fig. 40); similar stones of the Viking age occur in Hjermiser, Jutland, Bornholm,[4] etc. Viktor Rydberg[5] accepts the bronze age theory from a comparison of the shape of the ships de-

[1] *Nicolaysen, N.:* Langskibet fra Gokstad, Kristiania, 1882.

[2] *Hildebrand:* Glyphs of Ostergötland.

[3] *Holmberg, A. E.:* Skandinaviens hällristningar, Stockholm, 1846.

[4] *Thorsen, P. G.:* De Danske Runemindesmærker. *Stephens, Geo.:* The Runic Hall in the Danish Old Northern Museum.

[5] *Baltzer, L.:* Bohusläns Hällristningar, 1881 (introduction by Viktor Rydberg).

scribed by Tacitus,[1] from whose account it will be seen that the ships of the Suiones had stem and stern alike, both offering a front against attack from either side; furthermore, in both an inward curvature existed, while the boats of the bronze age, as illustrated by the rock sculptures, showed a marked difference between stem and stern.

According to Montelius no undisputable traces of mast and sails have been discovered in the rock sculptures of the bronze age, and the boats would seem to have been designed exclusively for rowing. Worsaæ,[2] however, figures a boat (Pl. LXXII) that plainly shows the mast, which, however, may have been added at a subsequent period.

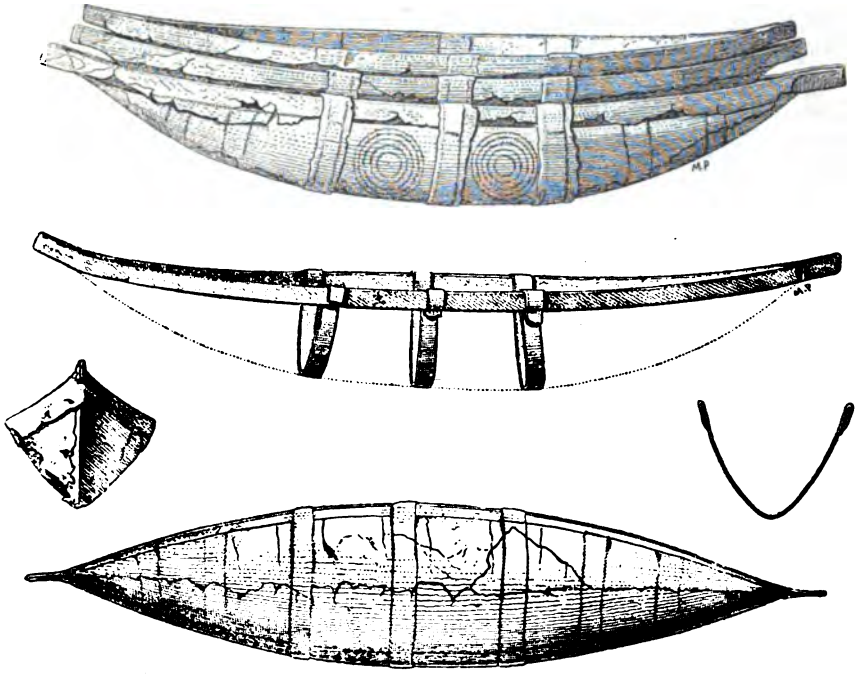

Fig. 41.

NEST OF GOLD BOATS FOUND AT NORS, DENMARK.

(Reproduced from "Votiv-fund fra Sten-og-Bronzealderen" in Aarböger for Nordisk Oldkyndighed og Historie, 1886.)

Gold Boats[3] (Fig. 41).—A fuller illustration of form is furnished by the unique find, in a bank at Nors, district of Thisted, Denmark, around which are many small grave mounds, and among fragments of pottery, of a clay vessel covered with a flat stone, and containing about one hun-

[1] *Tacitus:* De Germaniæ xliv "forma navium eo differt quod utriumque prora paratum semper appulsui frontem agit."

[2] *Worsaæ, J. J. A.:* Zur Alterthumskunde des Nordens, 1847, pp. 26, 27, Pl. xv.

[3] Votiv fund fra Sten og Bronzealderen. In Meddelelser fra det Kgl. Museum for de Nord Oldsager (Aarbøger for Nordisk Oldkyndighed og Historie, 1886, II Raekke, 1 Bind, Heft 3, p. 238.

dred small gold-plate boats laid within each other, as shown in the accompanying figure.

The railing and the ribs of these small boats are made of narrow and thin bronze bands that are bent around one another; in the middle of these lie sheets of thin plates of gold, whose corners overlap each other at the bottom of the boat and are bent around the bronze bands above, covering it. In the same manner the outside covering is effected.

The size of the boats and the number of ribs vary and some are ornamented with concentric circles.

Boat-shaped Monuments.—While the first appearance of the Northmen upon the western seas is shown to have taken place in the beginning of the sixth century,[1] there is strong and possibly conclusive evidence of their having entertained an active and intimate intercourse with the countries upon the eastern shores of the Baltic Sea; their traces are found in the Baltic provinces of Russia—in Estonia, Estnish Livonia, attaining a maximum in Livonia, and diminishing again in Courland—and in northern Germany.

The monuments that give us an account of such intercourse are the burial places in the form of ships; the stone ship of the land supplanting the wooden ship of the sea, upon which, according to ancient custom,[2] the dead were cremated and their ashes, together with their personal property, buried.

These stone, boat-shaped burial places are known by the names of Skibssætningar, Stenskeppar, Skeppshögar, Skeppsformer, Steinschiffe, Schiffsetzungen, Teufelsboote, Wella Laiwe. Their home is in Sweden,[3]

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[1] Greg. Turon. III, c. 3. Barthold: Geschichte der Deutschen Seemacht, 1850, Bd. 1, p. 304.

[2] Egils Saga, c. lxi (Heimskringla text). Gylfaginning, c. xlix (Heimskringla text). Hakon the Good Saga (Heimskringla text), c. xxvii. Landnama, ii. Laxdæla, c. viii. Vatnsdæla Saga, c. xxii. Ynglinga Saga, c. viii, xxvii.

[3] BLEKINGEN, *Worsaae, J. J. A.:* Zur Alterthumskunde des Nordens, 1847, p. 16, and pl. III. *Sjöborg,* Samlingar for Nordens Fornälskare, I, p. 116, pl. XIV, fig. 46, and pl. XX, fig. 60. *Grewingk, C.:* Zur Archäologie des Balticums (in Archiv. f. Anthropologie, X, p. 83. Aarbøger for Nordisk Oldkyndighed og Historie, 1881, p. 155. Antiquarisk Annaler, IV, p. 297. *Vedel, E.:* Bornholms Oldtidsminder og Oldsager, p. 27. BOHUSLÄN: Bidrag til Kännedom om Goteborgs och Bohusläns Fornminnen, 1874. *Grewingk, C.:* Z. Arch. d. Balt. (Arch. f. Anth., X, p. 83). *Holmberg:* Bohusläns Historie och Beskrifning, II, p. 192. GOTLAND, *Dr. Säve:* On Gotlands äldste Fornlemninger (I Ann. f. nord. Oldkynd, 1852, p. 130–170. *Vedel, E.:* Bornholms Oldtidsminder og Oldsager, p. 27. *Grewingk, C.:* Z. Arch. d. Balt. (in Arch. f. Anth., X). Bidrag til Kännedom om Goteborgs och Bohusläns Fornminnen, I, Stockholm, 1874. OELAND, *Älqvist:* Oelands Historia, I, p. 31. *Holmberg:* Bohusläns Historia och Beskrifning, II, p. 192. SCANIA, *Grewingk, C.:* Z. Arch. d. Balt. (in Arch. f. Anth., X). SÖDERMANLAND: Yellow Book, Den yngre Jernalder, p. 356. *Peterson's and Söderström's* Samlung. *Worsaae, J. J. A.:* Z. Alterthumsk. d. Nordens, 1874, p. 16, 32, and pl. IV. SVEARICKE: K. Vitterhets, Historie och Antiq. Akad., Stockholm (monthly). *Hellier, Gosselin,* Sec. R. Arch. Soc. of Gr. Britain, manuscript letter. *Brown, Mary A.:* Manuscript letter. UPLAND, *Grewingk, C.:* Z. Arch. d. Baltic. (Arch. f. Anth. X).

ROCK-CARVING AT MÖKLERYD, TORHAMN PARISH, BLEKINGE, SWEDEN.
(Copy of Plate XV, J. J. A. Worsaae's "Zur Alterthumskunde des Nordens," Leipzig, 1847.)

e they represent the early iron age.[1] They occur in Denmark, Bornholm.[2] About twenty-four such positions are known, while tland[3] only two have existed, of which one (at Højstrup, in Vester Herrel) is said to have been built upon graves from the earlier iron In Germany only two boat-shaped graves have been discovered, ralsund[4] and Köslin.[5]

the Baltic provinces of Russia forty-two boat-shaped graves have found and mostly examined; of these seven occur in Courland,[6] ing located in the diocese of Erwahlen, and with one exception occur in pairs, situated behind each other. The outlines of long, w, and pointed vessels are represented by a single row of stones. XXIII).

stem and stern posts are shown by large bowlders, thus indi- for these parts a considerable elevation above the bulwark of oats; depressions in the board-stones indicate the rowlocks. general direction of these ships is an easterly one, their dimen- 31 by 8, 27 by 13, 25 by 10, 31 by 10, 50.9 by 14, 49 by 10, 47.10 feet.

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he Lungersas (Goteland) ship runic stones of the later iron age occur. The form of Lille Lundley, Södermanland, terminates at one end in a Bauta upon which are the following words in runes: "*Spute and Halfdan raised ne after Skarde, their brother.*" The ship form at Raftötaugen, Blekingen, ed articles belonging to the later iron age.

l, E.: Bornholms Oldtidsminder og Oldsager, pp. 25–27. Petersen, L.: Manu- etter of July 7, 1887.

or John Daniel, Spazierreise von Kiel aus nach Norden 1693 (mss.). *Arnkiel:* sche Heydenbekehrung, Hamburg, 1702, p. 340. *Christiani:* Geschichte von wig Holstein, I, p. 328. *Thiele:* Danmarks Folkesagen, I, pp. 31–32. *Kier*, Pas- andschriftl. Gemeinde Annalen v. Osterlygum, 1812. *Handelmann, H.:* 28 t der Schleswig Holstein Lauenburg' schen Gesellschaft für die Sammlung haltung vaterländischer Alterthümer, Kiel 1868, p. 31. Antiq. Annaler IV, Aarböger f. Oldkynd, 1881, p. 155. *Vedel, E.:* Bornholms Oldtidsminder og er, p. 27.

wingk, C.: Erläuterungen z. Archaeol. Karte, etc. In Verhandl. d., gelehrten es., Dorpat, 1884; Bd., XII, p. 106. *Hagenow:* Baltische Studien d. Ges. f. Gesch., XV, 2, p. 49. *Grewingk, C.:* Z. Arch. d. Balt. (Arch. f. Anth. X).

wingk, C.: Erläuterungen z. Arch. Karte, p. 106.

ing, J.: Die Teufelsboote von Kurland in Sitzungsber d. Ges. f. Literat. und 1860–1863. Mitau, 1864, p. 154. *Hagenow:* In Baltische Studien d. Ges. f. Geschichte, XV, 2, p. 49. *Grewingk, C.:* Das Steinalter der Ostseeprovinzen, , 1865, p. 45. *Berg:* Notiz im Coresp. Blatt d. Naturf. Ges. z. Riga, XX, 1872, *Sievers, Graf C.:* Verh. d. Berliner Ges. f. Anth. Oct. 1875. *Sievers, Graf C.:* l. Estnischen gel. Ges., Dorpat, 1876, VIII, Heft 3. Grewingk, C.: Zur Archaeol. icums. (Arch. f. Anth., X). *Burchardt:* Baltische Monatsschrift, XXIV, Riga Sitzungsberichte d. Estnischen gelehrten Gesellschaft, May, Nov., Dec., 1876. *gk, C.:* Die Steinschiffe von Musching und die Wella Laiwe oder Teufelsboote d's überhaupt. Dorpat, 1878. *Grewingk, C.:* Erläuterungen z. archaeol. les Stein, Bronze, und Eisen-alters in Liv-Est und Kurland. Dorpat, 1884 d. Gel. Est. Ges. Dorpat. Bd., XII). *Grewingk, C.:* Die Neolithischen Be- von Kunda in Estland (Verh. d. gel. Est. Ges. Bd., XII). *Grewingk, C.:* Ost- he, dem heidnischen Todtencultus dienende, schifförmige und anders gestaltete tzungen. Dorpat, 1887.

At a depth of from 6 inches to a foot below the surface a large sto plate was found, serving as a cover to chests built of plates of eith natural or artificial formation. The cells of these chests were occupi by urns (figs. 42, 43, 44, 45) composed of gravel mixed with clay b

Fig. 42.

Fig. 45.

Fig. 43.

Fig. 44.

CINERARY URNS FROM BOAT-SHAPED GRAVE IN COURLAND, RUSSIA.
(Copied from *C. Grewingk:* "Die Steinschiffe von Musching, etc.," in Verh. Est. gel. Gesellschaft.)

little burnt, and containing more or less cremated human remai The accompanying Pl. LXXIII, copied from "C. Grewingk, Die Ste schiffe von Musching" shows in *a* the arrangement and outlines of th boat positions; in *b* a sectional view of one of the Musching boats; i the stone chests which have served for the reception of the cremat remains of the dead in the funeral urns shown in figures 42, 43, 44.

Similar boat-shaped graves occur in Estland,[1] Estnish Livonia.[2]

[1] *Kruse* Necrolivonica, Generalbericht 10, Tafel 59, fig. 9. Verhand. gel. E Ges, i, 2, p. 9. *Grewingk, C.:* Das Steinalter der Ostseeprovinzen. Dorpat, 1865, 56, 74. *Grewingk, C.:* Ueber heidnische Gräber Russisch Litauens (Verh. gel. Gesell. vi, 1870). *Hansen:* Samml. inländ. Alterth. Russlands, 1875, 1876. *Grewi C.:* Die neolithischen Bewohner von Kunda, 1884. *Wiskowatow, P.:* Bericht ü die Aufdeckung einer schifförmigen Steinsetzung bei Türsel in Estland (in Verh gel. Est. Ges. zu Dorpat, Bd. XIII, 1887). *Grewingk, C.:* Der schifförmige Aschenfr hofbei Türsel (Verh. d. gel. Est. Ges., XIII, p. 5–71, 1887). *Grewingk, C.:* Ostbaltis dem heidnischen Todtencultus dienende Steinsetzungen, 1887.

[2] *Kruse,* Necrolivonica, Beilage c. p. 10. *Grewingk, C.:* Das Steinalter der Ost provinzen, Dorpat, 1865. Verh. gel. Estn. Ges., vi, 3, 4, pp. 266, 269. Tafel xix. 40, 41. *Hartmann,* Vaterländ. Museum. Dorpat 1871. Taf. viii, fig. 6, 7, Taf. xi, fig. Sitzungsb. gel. Estn. Ges., 1873, p. 42; 1875, p. 159; May, Oct., Nov., Dec., 1876. *wingk, C.:* Z. Archæologie des Balticums (Archiv. f. Anthrop, x).

In Livonia[1] about thirty of such boat-shaped graves have been found (illustrated in Figs. 46, 47, 48).

The boat-shaped urn graves of Courland (Wella-Laiwe, figured on Pl. LXXIII) indicate but a comparatively short occupancy of the terri-

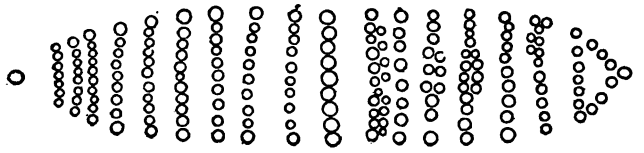

Fig. 46.

BOAT-SHAPED GRAVE NEU KARRISHOF, LIVONIA, RUSSIA.

(From *Л. Х. Штида* Раскопки, произведенныя въ Лифляндской усберніи.)

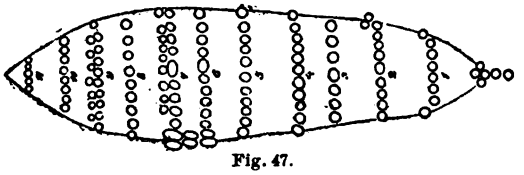

Fig. 47.

BOAT-SHAPED GRAVE AT MÄÄRO, LIVONIA, RUSSIA.

(From *Л. Х. Штида* Раскопки, произведенныя въ Лифляндской уберніи.)

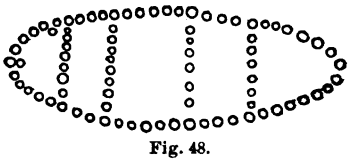

Fig. 48.

BOAT-SHAPED GRAVE AT WILLEMI, LIVONIA, RUSSIA.

(From *Л. Х. Штида* Раскопки, произведенныя въ Лифляндской уберніи.)

tory, while the cineraria of Livonia and Estonia, by their arrangement and contents, must have served as cemeteries during a considerable period of time, extending, probably, over several centuries.

One of the finest structures of this kind is the Slaweek ship[2] (Fig. 49) upon the shores of Lake Strante; it shows a double row of stones

[1] *Kruse:* Necrolivonica. Dorpat, 1842. *Bähr, J. K.:* Die Gräber der Liven. Dresden, 1850. Verh. d. del. Est. Ges. zu Dorpat I, 1860. *Grewingk, C.:* Das Steinalter der Ostseeprövinzen, 1865. *Sievers-Raudenhof, Jagor, von,* Sitzungber. d. Est. Gel. Ges. Feb., 1872, March, 1876. *Grewingk, C.:* Zur Archaeol. d. Baltic (Arch. f. Anth. X). *Sievers, Graf C.:* Verh. d. Berliner Ges. f. Anth., Oct., 1875. *Sievers, Graf C.:* Verh. d. gel. Estn. Ges. Bd. VIII, 3, p. 24, 1876. *Sievers, Graf C.:* Briefliche Mittheilungen und noch nicht gedruckter Bericht. *Grewingk, C.:* Erläut. 2, Arch. Karte. *Л. Х. Штида* Раскопки, произведенныя въ Лифляндской губерніи. *Jung, Herm, J.:* Die schiffförmigen Steinsetzungen im Fellinschen Kreise des Gouvernement Livland. (In 456 Sitzungsberichte d. gel. Estn. Gesellschaft, Dorpat 18. 13 Nov., 1878.) *Grewingk, C.:* Ueber ostbaltische, vorzugsweise dem heidnischen Todtenkultus dienende schiffförmige und anders gastaltete Steinsetzungen. 1887.

[2] *Sievers, Graf Karl:* Bericht über die im Jahre 1875 am Strantesee ausgeführten archäologischen Untersuchungen. In Verhandlungen der gelehrten Estnischen Gesellschaft zu Dorpat. Band VIII, Heft 3.

laid perfectly straight, with fourteen cross rows or benches, between most of which the calcined fragments of human bones, especially of skulls, mixed with ashes, cinders, and bones, were found imbedded in black soil; pottery was found in some of them. One hundred and twenty-nine articles were found in the various portions of the structure, consisting of fibulæ, bracelets of bronze, rings, spirals. knife blades

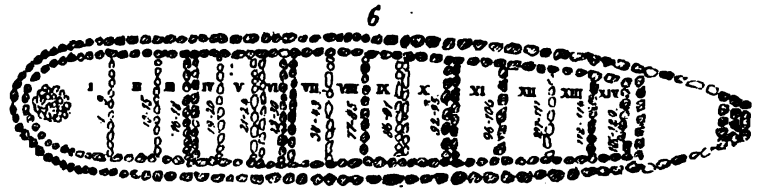

Fig. 49.

SLAWEEK SHIP, ESTONIA, RUSSIA.

(Copied from Graf C. Sievers- "Archäologische Untersuchungen" in Verh. Est. gel Gesellsch.)

of iron, ornaments of bronze, and gilded beads of glass, amber, and metal, etc. Some of the intervals show distinct traces of cremation, and exhibit thick layers of ashes and cinders; the calcined remains, however, were not left at these places, but were deposited in other intervals.

The boat-shaped cinerarium at Türsel, in Estonia,[1] recently explored, from its arrangement and tymbological contents, might serve as a fair representative of the numerous Livonian and Estonian cineraria without urn burial. While differing from most of them in point of material employed, consisting in calcareous slate plates against erratic bowlders, this difference is a mere local one, and results from the absence of the latter and occurrence of the former in the vicinity. Judging from its dimensions and comparatively small number of calcined human remains found, the ship appears to have served as burial place of a small family, which, however, distinguished itself by the wealth and beauty of articles and ornaments offered to the dead.

This cinerarium has been made the subject of a thorough study by the late Prof. C. Grewingk, of Dorpat, from whose report[2] I have borrowed the accompanying illustrations and notes:

"Fibula (Fig. 50) of Roman, or provincial Roman form is of frequent occurrence in the Balticum. It was found in the boat-shaped graves at Unnipicht and Langensee in North Livonia,[3] near the Strante Lake in southern Livonia, together with Roman coins from the years 69 to 79, and 161 to 180 A. D.,[4] in the stone ships of Ahschekippe and Sla-

[1] *Wiskowatow, P.:* Bericht über die Aufdeckung einer schiffförmigen Steinsetzung bei Türsel, in Estland. In Verhandlungen der gelehrten Estnischen Gesellschaft zu Dorpat, 1888. Band XIII.

[2] *Grewingk, C.:* Der schiffförmige Aschenfriedhof bei Türsel in Estland. In Verhandlungen der gelehrten Estnischen Gesellschaft. Band XIII, 1888.

[3] Archiv für Anthrop. x, p. 95. Tf. ii, fig. 11. and 12 *Aspelin:* Antiquités du Nord Finno-Ougrien. Helsingfors 1877–1884. fig. 1760

[4] *Aspelin:* Antiq, fig. 1788.

week,[1] in Courland in the deposits of arms of Dohbesberg, in the skeleton graves of Ringen, and in cinerary urns in the graves of Capsehten,[2] in Prussia, in cineraria with and without urns, together with Roman coins of the second and third century[3] in Rosenau, near Königsberg,[4] at Marienburg,[5] in Poland,[6] in Meckleburg, Nydam Moss, etc.

"Fibula (Fig. 51) of bronze with iron axis. Corresponding ones were found near Odsen, Livonia,[7] in the stone ships of Ahschekippe and

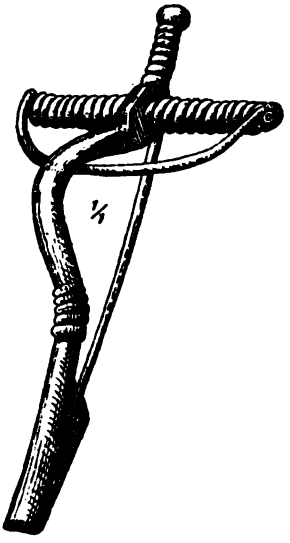

Fig. 50.

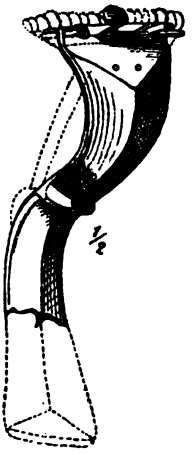

Fig. 51.

FIBULÆ FROM CINERARIUM AT TÜRSEL, RUSSIA.

(Copied from C. Grewingk in Verh. gel. Est. Ges. 1868. Bd. XIII.)

Slaweek,[8] in the Polish District Augustowo.[9] Similar forms occur in the cineraria of Elbing and Olivia, Prussia, upon Bornholm, and in Norway.[10]

[1] *Sievers, Graf C.:* Bericht über arch. Untersuchungen. In Verhandl. d. gel. Est. Gesellschaft zu Dorpat. Bd. VIII, 1876. Heft 3 mit Tafel i–iii. *Sievers, Graf. C.:* Ueber ein normänn. Schiffsgrab bei Ronneburg. In Verhandl. d. Berliner Gesellsch. f. Anthrop. Jahrg. 1874–1875. Sitzung vom 16 October, p. 14–17 und Tafel viii. *Aspelin:* Antiq., Fig. 1819.

[2] *Grewingk, C.:* Erläuterung z. arch. Karte, p. 12.

[3] *Tischler:* Ostpreussische Gräberfelder iii. In Schriften der physik-öknom. Gesellsch. zu Königsberg XIX, 1879, p. 205. Taf. ix, Figs. 6 und 11. *Tischler:* Ueber die Formen der Gewandnadeln. Zeitschr. f. Anth. u. Urgeschichte Baierns IV. Heft 1 und 2. München, 1881. Mit 4 Tf. p. 31.

[4] *Berendt:* Zwei Gräberfelder in Natangen. Königsberg 1874. Tf. viii fig. 3 and 37–40.

[5] *Lissauer und Conwentz:* Das Weichsel-Nogat Delta. Schriften d. Naturf. Ges, zu Danzig. 1886, p. 228. Tf. ii, fig. 31.

[6] Sammlung des Collegium Jagellonicum zu Krakau. *Aspelin:* Antiq. fig. 1904.

[7] Sammlung der gelehrten Estnischen Gesellschaft zu Dorpat.

[8] *Aspelin:* Antiq. fig. 1815.

[9] Archiv f. Anthrop. x, 94 and 300. Also remark 139. *Aspelin:* Antiq. figs. 1902.

[10] *Undset:* Das erste Auftreten des Eisens in Nord Europa. Hamburg 1882, p. 481, fig. 193.

"Fibula of iron (Fig. 52) of gigantic dimensions. The eye-shaped holes upon the axis correspond to those from Türsel, Kauger, and Odsen and appear as the trade-mark from which to conclude on similar source and age. It resembles a specimen found at Ascheraden upon the Duna,[1] which, however, is of much more recent make; similar forms have been observed in the stone positions of Rippoka, and Lake Strante in central Livonia.[2]

"Figs. 53 and 54 are fibulæ with reversed bodies; they are the first of their kind found in the Baltic provinces.

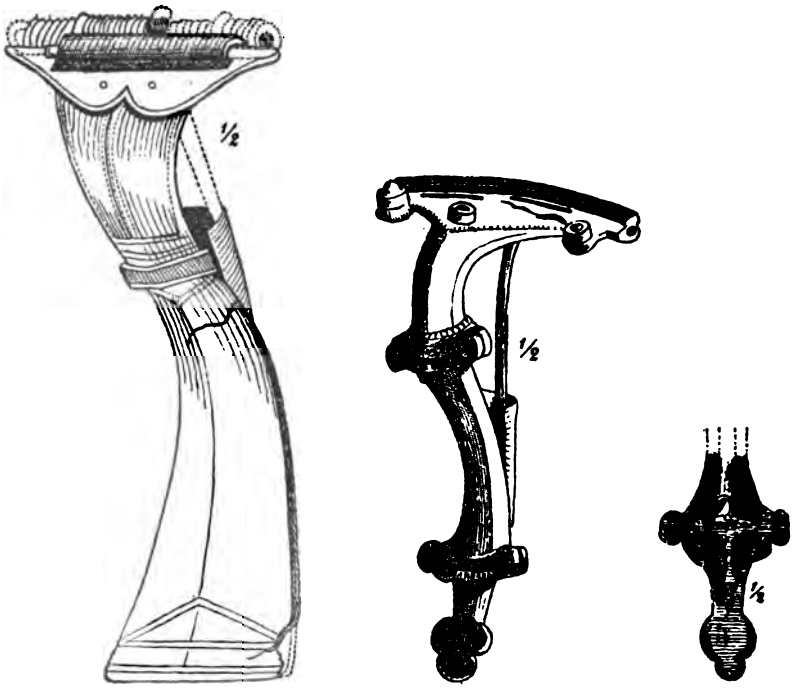

Fig. 52. Fig. 53. Fig. 54.

FIBULÆ FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1868. Bd. xiii.)

"Fibulæ similar to those figured in numbers 55, 56, 57 are known from the boat grave of Määro.[3]

"Fig. 58 had been subjected to the action of fire and was found upon the second phalanx of the little finger of an apparently female hand. This form is characteristic of the cineraria of the first Iron age in Livonia, Estonia, and Finland. They have been found in the Ostrobottnien district of Finland[4] in several cineraria of Estonia (Uxom) and Livonia

[1] Sitzungsber. d. gel. Estn. Ges. zu Dorpat, 1871, p. 78, with cuts.

[2] Archiv f. Anthrop. x. pl. ii, fig 5b. *Undset:* Erstes Auftreten des Eisens in Nord Europa. Hamburg, 1882, pl. xvii, fig. 4.

[3] Archiv f. Anthrop. x, pl. ii, fig. 5, p. 94. *Hartmann:* Vaterländ. Museum zu Dorpat, 1871, p. 79, pl. viii.

[4] *Aspelin:* Antiq. fig. 1280, 1281.

at Kosse, Neu-Camby, Unnipicht, Willefer,[1] near Lake Strante, in the boat positions of Ahschekippe and Slaweek.[2] Very similar forms have been found in skeleton graves in the district of Kowno,[3] in graves at

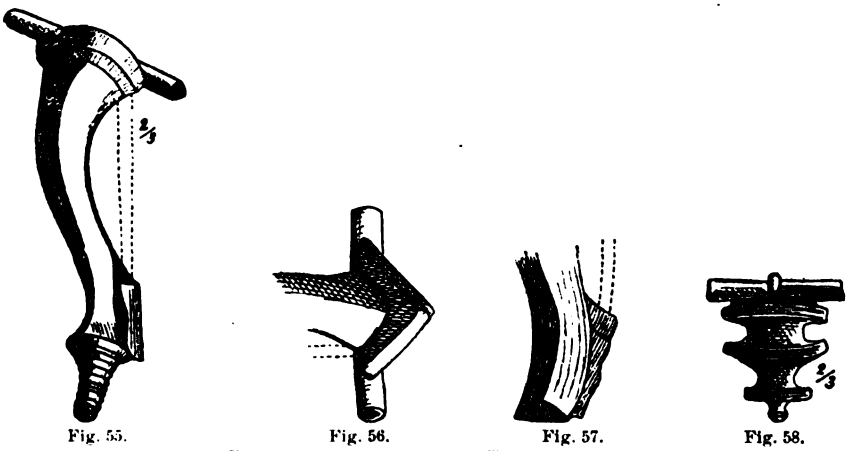

Fig. 55. Fig. 56. Fig. 57. Fig. 58.

FIBULÆ FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1888. Bd. XIII.)

Brandenburg,[4] and Olivia, near Danzig, Prussia;[5] resemblance to this form is shown in fibulæ from Bornholm,[6] Gotland, and Oeland,[7] and from Rhenish Prussia.[8]

Fig. 59.
BREASTPIN FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1888. Bd. XIII.)

"Breastpin or perforated fibula (Fig. 59) occurs in similar form in the Slaweek boat,[9] in the district of Kowno, in the Prussian urn cemeteries

[1] *Hansen:* Sammlungen inländ. Alterthümer. Reval, 1875, p. 40. No. 8, pl. viii, fig. 20. *Jung:* Sitzungsberichte d. Est. Ges. 1878, p. 191.
[2] *Aspelin:* Antiq. figs. 1789, 1801, 1780, 1803, 1813, 1814.
[3] Archiv f. Anthrop. x. 94, pl. ii, fig. 2. *Aspelin:* Antiq. 1896.
[4] *Tischler:* Gräberfelder iii, pp. 197 and 256, pl. ix, fig. 23 and 15, pl. xi, fig. 4.
[5] *Lissauer:* Schriften d. Naturf. Ges. zu Danzig III, 1874. Pl. iv, fig. 13.
[6] *Kanisky:* Baltische Studien. Jhrg. 27. Stettin 1877, pp. 168–202, fig. 25.
[7] *Montelius:* Antiq. Suédois. Stockholm, 1873. Fig. 323, 328, 317.
[8] *Emele:* Beschreibung der Alterthümer. Mainz, 1833, pl. xv, fig. 5.
[9] *Aspelin:* Antiq. Fig. 1809.

of the district of Rastenburg,[1] and in the Roman colonies upon the Rhine and in Hanover.

"Ornamented disk of bronze plate, rim turned down, with iron knob in the middle with iron pin, is figured in 60 and 61. It recalls the *phalera* of a Roman soldier,[2] or the ornament of a warrior as found in Nydam Moss.[3] Similar forms have been found in the Baltic provinces, in Pomerania.[4] Their form is also approached in specimens from the urn graves in Courland,[5] in the districts of Wilna and Wilkomirz,[6] and in East Prussia.[7]

"Horseshoe-shaped ornament (Fig. 62) resembles the *armilla* of a Roman soldier.[8] The circular or disk ornamentation recurs upon the

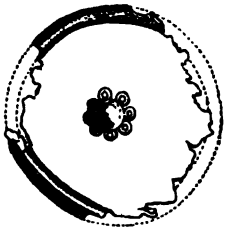

Fig. 60.

Fig. 61.

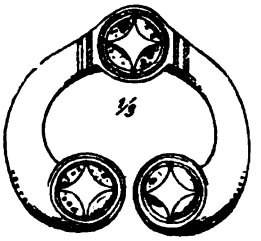

Fig. 62.

ORNAMENTS FROM CINERARIUM AT TÜRSEL, RUSSIA.

(Copied from C. Grewingk in Verh. gel. Est. Ges. 1888. Bd. XIII.)

handle of a Roman treasury box,[9] while the four-pointed star in the interior of the disk ornamentation has been found upon articles from Livonia and Courland.[10]

"Fig. 63 is a bronze pin, apparently belonging to a buckle, nor is the possibility excluded that it may have formed part of the horseshoe-shaped ornament just described.

"Another horseshoe-shaped ornament is found in Fig. 64, the ends being wound in spirals. The spiral is one of the oldest forms of metal decoration of the earliest Baltic bronze age.

"Fig. 65 is a bronze ring; has been injured by action of fire. Similar rings, although somewhat smaller, occurred in the Slaweek boat.[11]

[1] *Aspelin:* Antiq. Fig. 1884. Verh. d. Berl. Ges. f. Anthrop. 1885, p. 247. Sitzungsber. d. Alterthumsgesellschaft "Prussia" in Königsberg. Nov. 1885–'86, pp. 9, 116, 143.

[2] *Lindenschmit:* Alterthümer heid. Vorzeit. I. Heft 4, Pl. 6.

[3] *Montelius:* Die Cultur Schwedens in vorchristlicher Zeit. Berlin 1885, p. 105, cut.

[4] Photogr. Album d. Berliner Ausstellung, 1880, Sect. ii, Pl. 23 and 24. Catal. s. 324 No. 99, Sect. iii, Pl. 4.

[5] *Aspelin:* Antiq. Fig. 1845.

[6] Sammlung Prodczacynski in Krakau.

[7] *Undset:* Erstes Auftreten des Eisens, p. 222.

[8] *Lindenschmit:* Alterthümer Bd. I, Heft 6, Pl. 5. Emele: Alterthümer Rheinhessens. Mainz 1833, Pl. 29, Fig. 2.

[9] *Wagner:* Handbuch d. Alterthumskunde, 1842, Fig. 297.

[10] *Aspelin:* Antiq. Fig. 1776, 1778, 1784, 1785.

[11] *Sievers, Graf K:* Bericht über archäologische Untersuchungen, 1875. Verhandl. d Estn. Gesellsch. Bd. VIII, Heft 3. Dorpat 1876, Pl. I, Fig. 43, p. 8, No. 22, and p. 17, No. 32.

"Fig. 66 is a necklace; the form recurs in stone positions in Courland,[1] in the district of Kowno and Wilna, Russia,[2] and near Marienburg, in Prussia.[3]

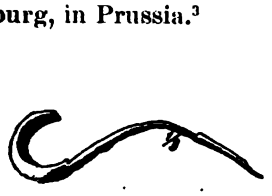

Fig. 63.
BRONZE PIN.

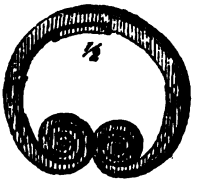

Fig. 64.
ORNAMENT.

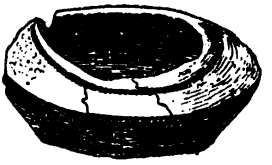

Fig. 65.
BRONZE RING.

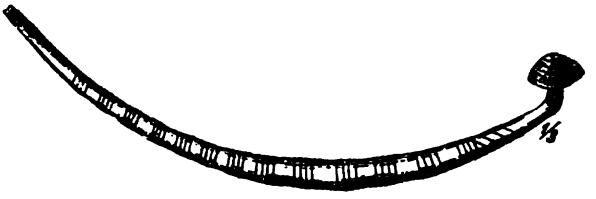

Fig. 66.
NECKLACE

Fig. 67.
NECKLACE.

Fig. 68.
ORNAMENT.

Fig. 69.
ORNAMENT.

FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1898. Bd. XIII.)

"A necklace is also shown in Fig. 67. This form is known from the stone boat at Fellin and other places in Estonia,[4] from skeleton graves in Courland,[5] in the Russian district of Kowno,[6] and from cineraria, at the mouth of the river Memel, in Prussia.[7]

"Figs. 68 and 69 are the fragments of an ornament. They have thus far not been known to have been found in graves.

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[1] *Aspelin:* Antiq. Figs. 1826, 1875, 1880.
[2] *Aspelin:* Antiq. Figs. 1892, 1900.
[3] *Undset:* Erstes Auftreten des Eisens, p. 139, Pl. xv, Fig. 13.
[4] *Aspelin:* Antiq. Figs. 1764 and 1786.
[5] *Aspelin:* Antiq. Fig. 1879.
[6] *Hartmann:* Vaterländ Museum, p. 35, Pl. ii, Figs. 20, 21. Aspelin: Antiq. Fig. 1885.
[7] Photogr. Album d. Berliner Ausstellung 1880; Sect. i, Pl. 13; Cat. 418, Nos. 520–542. *Tischler:* Gräberfelder iii, Pl. c, i, Fig. 16.

"In Fig. 70, a necklace or bracelet is shown of a form found upon Usedom, in Pomerania,[1] and in larger dimensions in a skeleton grave in Mecklenburg,[2] and near Thale, in the Harz Mountains.[3]

"Necklaces or arm rings are shown in Figs. 71, 72, 73, 74. They have been found in Courland and Kowno district.[4]

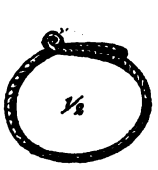

Fig. 70.

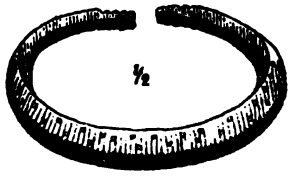

Fig. 71.

Fig. 72.

Fig. 73.

Fig. 74

ARMRINGS OR NECKLACES FROM CINERARIUM, AT TÜRSEL, RUSSIA.

(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1888, Bd. XIII.)

"Bracelet or fragment of belt hook (Fig. 75). Similar forms have been recovered from the cemetery at Elbing and cinerarium at Olivia, near Danzig;[5] they have been found in Pomerania[6] and in Schwarzburg Rudolstadt.[7] Worth mentioning is the girdle hook from an urn in Brandenburg, Prussia, and a peculiarly jointed bracelet from Oeland.[8]

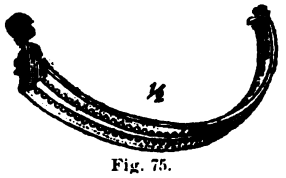

Fig. 75.

Fig. 76.

CLASPS FROM CINERARIUM AT TÜRSEL, RUSSIA.

(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1888, Bd. XIII.)

"The clasp (Fig. 76) has suffered from high temperature; a similar form is known from Courland.[9]

"The spiral spring of bronze (Fig. 77) occurs in the *ψελιον* of the Persians, as described by Herodotus, and also in the armament of Scandi-

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[1] Berliner Photogr. Album 1880; Sect. ii, Pl. 20; Cat. 322, No. 56.

[2] *Lisch:* Friederico-Franciscanum. Leipzig 1837, Pl. x, Fig. 2.

[3] Berliner Album, 1880. Sect. vi, Pl. 14, Cat. 527.

[4] *Aspelin:* Antiq. Figs. 1769 (Langensee), 1835 (Kandau), 1838 (Passeksten), 1866 (Wistu-Kappi), 1877 (Herbergen).

[5] *Undset:* Erstes Auftreten des Eisens, pp. 147 and 140, Pl. xv, Figs. 10 and 14. *Tischler:* Gräberfelder III, Pl. C, I, Fig. 11.

[6] Berliner photogr. Album, Sect. iii, Pl. 19, Cat., p. 324.

[7] Berliner photogr. Album, Sect. vi, Pl. 22, Cat. 590, Nos. 39 and 40.

[8] *Undset:* Erstes Auftreten des Eisens, p. 200, Pl. xxi, Fig. 1, and p. 386, Fig. 63.

[9] *Aspelin:* Antiq. Fig. 1797.

navian warriors of the early bronze age; it has been described as a German protective armor and appears to be very frequent during the younger heathenish iron period in the Baltic lands. A corresponding specimen was found in the Strante ship.

"Figs. 78 and 79 are finger-rings of bronze wire; their chemical composition places them nearest to the bronze fibulæ from Herbergen, in Courland, whose form corresponds to one from the Ahschekippe stone position.[1] These rings are of frequent occurrence in the graves of the first East Baltic iron period.

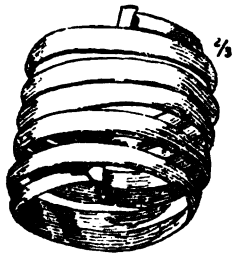

Fig. 77.

Fig. 78.

Fig. 79.

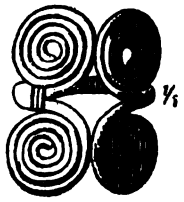

Fig. 80.

SPIRALS FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1898, Bd. XIII.)

"Fig. 80 is a finger ring corresponding in form to rings found in the Estonian district Harrien,[2] in the stone heap of Rippoka, in Livonia.[3] The same form, but in silver, together with silver nippers, was found in a cinerarium in the East Prussian district of Gumbinnen.[4] These forms may be traced to the younger iron period, as, for instance, in the graves upon Oesel and as cast imitations in the Wotish skeleton graves near Gatchina.[5] A like ornamentation is noticeable in Mecklenburg,[6] and one specimen was taken from a Roman grave in the Upper Palatinate.[7]

"Fig. 81 represents a pair of bronze nippers; similar ones were taken from the Strante ship, from the urn graves near Libau, Russia,[8] and from a cemetery in the province of Prussia.[9]

"Nippers of iron are shown in Fig. 82, and the same form occurred in the Strante see Krawand, and in graves in Prussia.[10]

"Fig. 83 shows a buckle of bronze of the same form as were found in the urn graves at Libau and in East Prussian grave fields.[11].

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[1] Archiv f. Anthrop. x, 301. Analysis No. 5, Pl. ii, Fig. 9.
[2] *Hansen:* Alterthümer. Reval 1875, p. 41, Pl. v, Fig. 21.
[3] *Hartmann:* Vaterländ. Museum, Pl. xi, Fig. 11.
[4] *Tischler:* Gräberfelder iii, Pl. x, Fig. 13, p. 261, grave No. 31.
[5] *Aspelin:* Antiq. Fig. 1162; also Figs. 803, 1046, 1951, 1970, 1992, 2084.
[6] *Lisch:* Friderico-Francisceanum, Pl. xxii, Fig. 1.
[7] *Lindenschmit:* Alterthümer heidn. Vorzeit. Bd. i, Heft 5, Pl. 4, Fig. 5.
[8] *Aspelin:* Antiq. Fig. 1841.
[9] *Tischler:* Gräberfelder iii, Pl. x, Figs. 6 and 7.
[10] *Undset:* Erstes Auftreten des Eisens, Pl. x, 19; xiii, 14; xiv, 8 and 9.
[11] Berliner photogr. album, 1880. Sect. i, Pl. 2.

"Figs. 84, 85, 86 represent belt fastenings of bronze; corresponding forms occur in the stone heaps of Strantesee; they are often met with in the first Baltic iron period, and in the younger Scandinavian bronze age.

Fig. 81.

Fig. 82.

NIPPERS FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from *C. Grewingk*, in Verh. gel. Est. Ges. 1888. Bd. XIII.)

"A lance point is shown in Figs. 87 and 88; similar point was found in the Kaugerkrawand in Livonia, together with Roman coins of the years 161 to 180.

"Figs. 89, 90, 91, and 92 are single-edged iron knives, of a form not otherwise known in the East Baltic Lands. Some knives from the

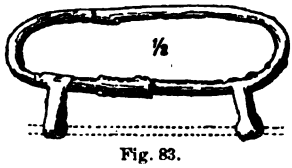


Fig. 83.

BUCKLE FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1888. Bd. XIII.)

Slaveek ship[1] approach the form, as also some from the Finnish District Wasa.[2] Knives corresponding to those found at Türsel have been taken from graves of the first iron period in the province of East Prussia,[3] and they have also occurred at Ascheraden, in skeleton graves of the younger iron period."[4]

Fig. 84.

Fig. 85.

Fig. 86.

BELT-FASTENINGS FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1888. Bd. XIII.

From the large number of imported bronze articles found Grewingk concludes that the foreign intercourse with Türsel appears to have been more extended than with any other portion of Estonia and Livonia;

[1] *Sievers, Graf K.*, Bericht in Verhandl. d. Estn. Ges VIII Heft 3, Pl. i, Fig. 34, 43–45.
[2] Archiv f. Anthrop. X, p. 81, 310.
[3] *Berendt:* Zwei Gräberfelder in Natangen. Königsberg, 1874. Pl. i, Fig. 26; Pl. vii, Figs. 26, 30. Sitzungsber. d. Alterthumsges. "Prussia." Nov. 1885–86, p. 9, Pl. iv.
[4] *Aspelin:* Antq. Fig. 1921 and 2085.

and in view of the fact that the neolithic inhabitants of that section obtained their flint supplies from the West Baltic lands and that such intercourse had continued during the Scandinavian bronze age (500 B. C.) the helleristinger of which show rowboats, he connects the boat graves of Estonia and Livonia with the typical form of Suionian ships as shown in the Nydam boat belonging to the identical period (the third century), and suggests that the stone ship-burials served as the forerunners of the wooden funeral ships of the Vikings.

Fig. 87.

Fig. 88.

Fig. 89.

Fig. 90.

Fig. 91.

Fig. 92.

LANCE POINT AND KNIVES FROM CINERARIUM AT TÜRSEL, RUSSIA.
(Copied from C. Grewingk, in Verh. gel. Est. Ges. 1868, Bd. XIII.)

Another fact to be considered in this connection is the age of the Roman coins found in the various cineraria of Estonia and Livonia; they represent the period of from 30 B. C. to 244 A. D. Among them are: denars of Augustus, Vespasian, Faustina, Antoninus Pius, a Gordian, etc., thus representing almost the identical coins found in the Nydam boat, the consideration of which will form the next chronological step.

Before taking up the Nydam boat, however, the following table, showing the dimensions of a number of boat-shaped stone positions, may not be out of place here.

In the following table the dimensions are given of a number of these boat-shaped stone positions.

Locality.	Length.	Width.
	Feet.	*Feet.*
Käseberg, Scania, Sweden	212	60
Neu Karrishof, Livonia, Russia	189	57
Eds, Upland, Sweden	182	50
Runsa, Stockholm, Sweden	182	50
Villefer, Livonia, Russia	159	52
Vestermarie, Bornholm, Denmark	157	63
Braidflor, Gotland, Sweden	144	18

Dimensions of boat-shaped positions—Continued.

Locality.	Length.	Width.
	Feet.	*Feet.*
Strante, Livonia, Russia	142	27
Blonsholm, Bohuslan, Sweden	141	31½
Gotland, Sweden	140	33
Slaweek, Livonia, Russia	140	40
Stralsund, Germany	130	16
Kawershof, Livonia, Russia	126	42
Määro, Livonia, Russia	120	37
Vestermarie, Bornholm, Denmark	103	40
Do	103	25
Hortehammer, Bleking, Sweden	100	29
Vestermarie, Bornholm, Denmark	97	14½
Kronoberg, Sweden	92	32
Willemi, Livonia, Russia	89	29
Vestermarie, Bornholm, Denmark	85	14½
Kawershof, Livonia, Russia	70	24
Vestermarie, Bornholm, Denmark	62½	12½
Do	53	25
Do	52½	14½
Lieben, Courland	50½	14
Eista, Gotland, Sweden	50	16
Farö, Gotland, Sweden	50	8
Türsel, Estonia, Russia	50	20
Vestermarie, Bornholm, Denmark	50	8½
Widser, Courland, Russia	49	10
Nogallen, Courland, Russia	47.10	10
Vestermarie, Bornholm, Denmark	42	10
Do	37½	8½
Do	34½	7½
Little Lundley, Södermanland, Sweden	34	10
Lieben, Courland, Russia	31	10
Strante, Livonia, Russia	31	8
Vestermarie, Bornholm, Denmark	31	6
Mushing, Courland, Russia	27	13
Do	25	10
Archma, Livonia, Russia	22	9

The Nydam Boat.[1]—The oldest Scandinavian naval relic, part of an oar, was found in the Nydam Moss, northeast of Flensburg, in the Duchy of Schleswig, in the year 1859, and the remaining part of the same oar in 1862. On August 7, 1863, the remains of a boat were excavated; on October 18, 1863, a large and magnificent oak-built boat

[1] *Engelhardt, C.:* Denmark in the Early Iron Age. London, 1866. *Handelmann, H.:* 35 Bericht z. Alterthumskunde Schleswig-Holsteins, 1878. *Handelmann, H.:* Das älteste germanische Seeschiff. In Corr. Bl. d. D. Ges. f. Anth., No. 12, Dec., 1871, p. 95; No. 1, Jan. 1872, p. 8. *Stephens, Geo.:* Nydam Moss. In Gentleman's Mag., Oct. 1863, New Ser., vol. xx, p. 681. *Werner, R.:* Das Seewesen der Germanischen Vorzeit. In Illust. Monatsh., 1882, Oct. *Boehmer, Geo. H.:* Norsk Naval Architecture. In Proc. U. S. Nat. Mus., Vol. IX.

was discovered lying in the direction of the valley, from southeast to northwest, and on October 29, 1863, a third boat, built of fir, was found at the side of the second boat and parallel with it.

The first of these boats was in a very poor state of preservation, having evidently been intentionally destroyed; nevertheless the fragments found and taken up displayed sufficient resemblance to the corresponding parts of the second and third boats to indicate the same construction for all three. The second and best preserved was placed in the hands of Mr. Stephenson, restorer of antiquities, at Copenhagen, and of the restored boat the accompanying Figures 93 and 94 are

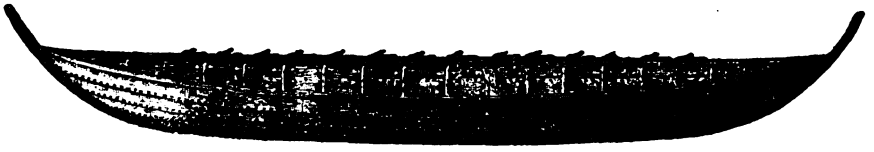


Fig. 93.

NYDAM MOSS BOAT.

(Copied from C. Engelhardt, "Denmark in the Early Iron Age.")

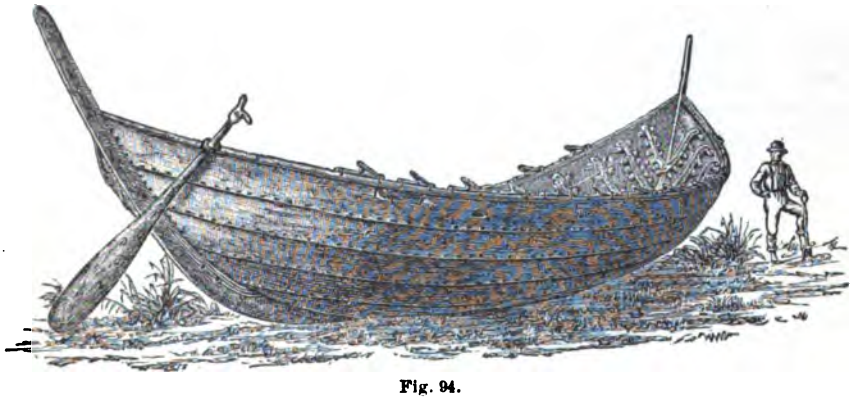


Fig. 94.

NYDAM MOSS BOAT.

(Copied from C. Engelhardt "Denmark in the Early Iron Age.")

representations as figured by Prof. C. Engelhardt *, under whose direction the excavation of Nydam Moss had been conducted and from whose work the following description has been taken:

"When first discovered the boat was, of course, no longer in its original state. In course of time the washers of the bolts by which the planks were fastened together had corroded, the ropes joining the outer parts of the boat to the inner framework had been destroyed, the planks in consequence had separated and resumed their original shape, the rowlocks had fallen from the gunwale, the ribs had sunk out of their proper places and lay in different directions, whilst the stem and stern posts had detached themselves from the bottom plank. By degrees, as

* *Engelhardt, C.:* Denmark in the Early Iron Age. London 1886.

the boat fell to pieces, these sank to the bottom to about the same depth, while the peat, at the same time, grew up around them, covering and protecting them from destruction. The shape of the boat could not therefore be directly ascertained from the pieces found, and the sketches of it were not made until, after the lapse of so many centuries, it had been restored to its original form in the Museum of Northern Antiquities at Flensburg. No drawing, however, can fully convey the striking impression produced by the large, sharp, and well-built boat itself.

"The boat is 77 feet long, measured from stem to stern, and proportionally rather broad in the middle, namely, 10 feet 10 inches, flat at the bottom, but higher and sharper at each end (Pl. LXXIV).

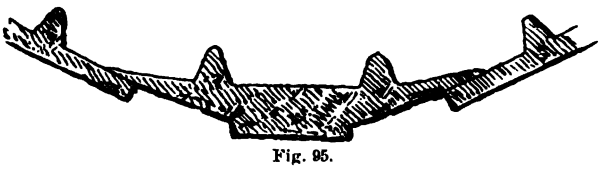


Fig. 95.

KEEL PLANK OF NYDAM BOAT.

(Copied from C. Engelhardt, "Denmark in the Early Iron Age.")

"It is clinker-built, and consists of eleven oak planks, viz., five on either side, besides the bottom plank (Fig. 95), of which the keel form part, the latter being only a little more than 1 inch deep and fully 8 inches broad at the middle of the boat, gradually diminishing and at last vanishing entirely toward the sternpost.

"The planks are held together by large iron nails (Fig. 96), at intervals of 5½ inches, with large, rounded heads outside, and square burrs

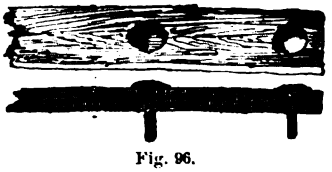


Fig. 96.

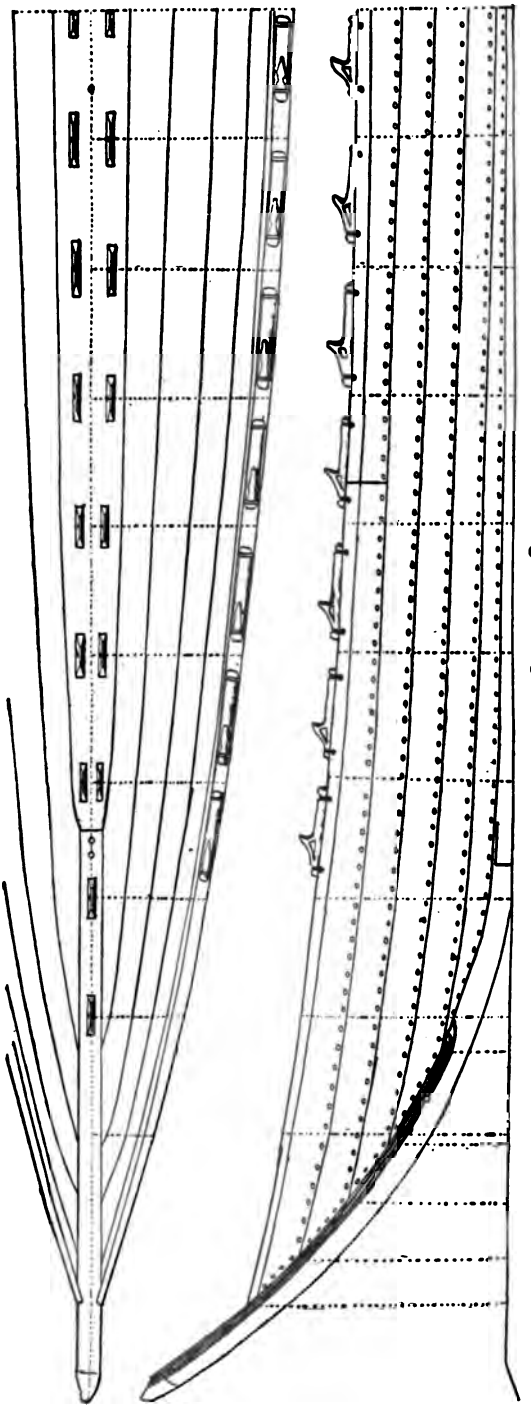
RIVETS OF NYDAM BOAT.

(Copied from C. Engelhardt, "Denmark in the Early Iron Age.")

or washers, inside. The spaces between the planks where they overlap each other were filled up—caulked—with woolen stuff and a pitchy, sticky substance.

"The planks are cut from very fine pieces of timber, the bottom plank being 46 feet 8 inches long, and all of one piece. On both stems, which are fixed to the bottom plank by means of wooden pegs (Fig. 97), there are ornamental grooves, and each of them shows two large holes, which, to judge from the marks of wear, most likely have served to pass the ropes through when the boat was hauled ashore.

"On all the planks there are perforated clamps of one and the same piece with the planks (Fig. 98) themselves, having been left projecting when the planks were cut out of the solid timber, a most surprising



BOAT FOUND IN NYDAM MOSS, SCHLESWIG, GERMANY.
(Copied from C. Engelhardt's "Denmark in the Early Iron Age.")

fact, considering the high development to which the smith's art had been carried, a fact, too, which proves that they must have possessed a great abundance of timber, as they would not otherwise have wasted it to that degree only in order to save a few nails or to secure the clamps so much better.

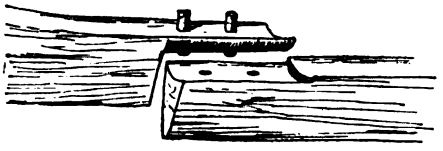


Fig. 97.
CONNECTION OF PROWS WITH KEEL.
(Copied from C. Englehardt, "Denmark in the Early Iron Age.")

"The ribs, which give the boat its shape (Fig. 99), are mostly in their natural crooked and irregularly bent shape, and rest on the clamps projecting from the planks which form regular rows across the boat, those on one plank exactly corresponding to those on the next. The ribs have perforations corresponding to the clamps, through which bast ropes were passed, tying planks and ribs together (Fig. 100). This is again highly surprising in a nation familiar with the use of iron and

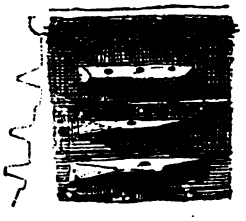


Fig. 98.
CLAMPS ON PLANKS.

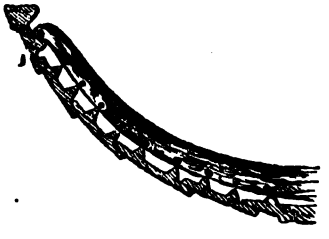


Fig. 99.
CONNECTION BETWEEN RIBS AND PLANKS.
(Copied from C. Englehardt, "Denmark in the Early Iron Age.")

able to work it so well. At the same time it is possible that a loose connection between the framework and the planking of the boat served to give it more elasticity to the sides, and that boats built in this manner went through the surf and great waves easier than those more strongly built.

"Upon the gunwale were fixed the rowlocks which, although made of the same general model, yet all differed from one another in size or in the details of the work. Fig. 101 represents one of the best preserved. They were tied to the gunwale by means of bast ropes; and in this case, too, it might seem surprising that for the fixing of such important pieces as the rowlocks recourse should have been had to such weak fastenings, which must so often have required to be renewed. But this method had at the same time the advantage of rendering it possible to turn them when necessary and row the boat in the opposite direction, particularly as both ends of the boat were so exactly alike that it is difficult to say

which is the prow and which the stern. It is true that the width of the boat at the fourth rib is a few inches greater than at the fifteenth, which corresponds to it at the other end; but this difference is so small that it was probably not intentional, and the boat has, no doubt, been designed to shoot through the waves with equal speed, whichever way it was rowed. The oars were passed through loops of rope tied to the rowlocks, on which the marks of wear by the oars are still quite visible.

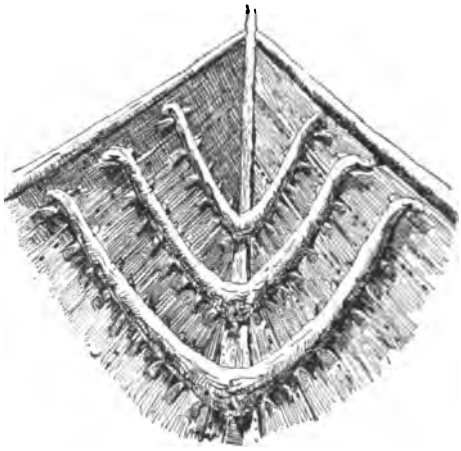


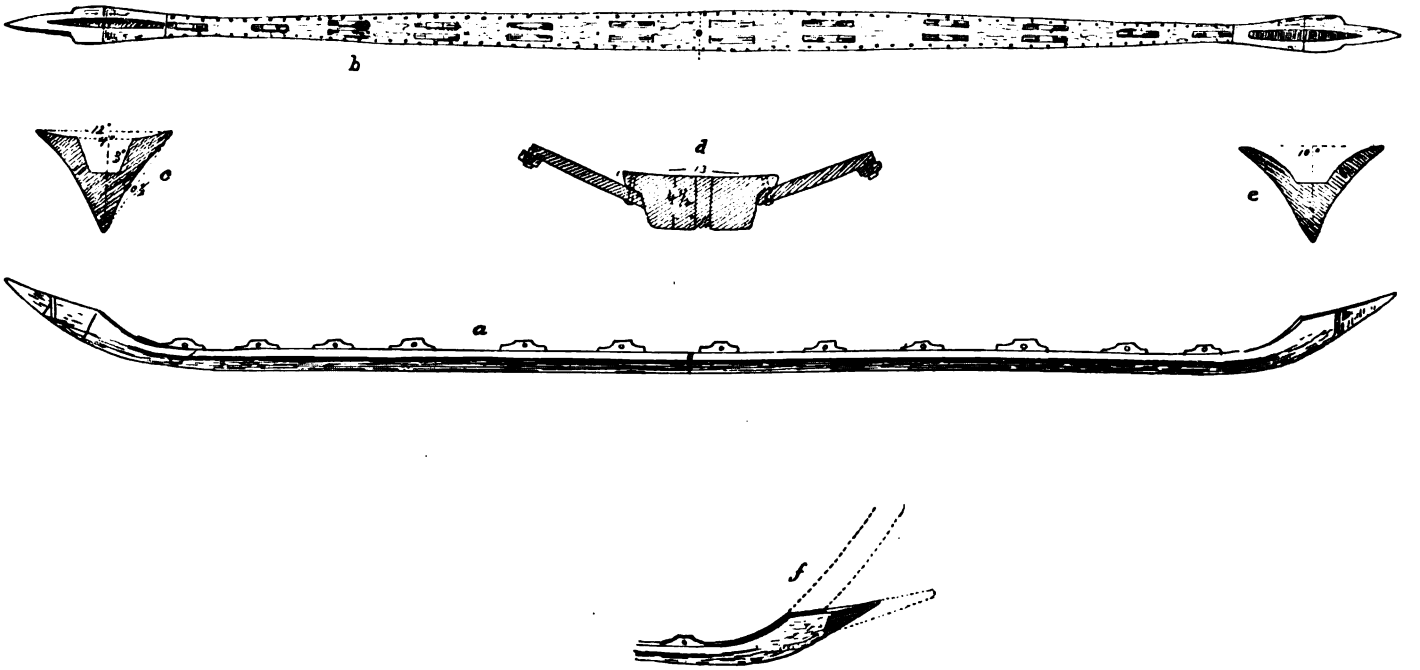
Fig. 100.
INTERNAL VIEW OF STEM.
(Copied from C. Engelhardt "Denmark in the Early Iron Age.")

"At the sides, about 10 feet distant from the stern, the rudder (Fig. 102) was discovered. Its length is 9 feet 7 inches, and near the middle it has a hole through which a rope may have been passed for the purpose of tying it to the side of the boat. Just below this hole there is

Fig. 101.
ROWLOCK OF NYDAM BOAT.
(Copied from C. Engelhardt, "Denmark in the Early Iron Age.")

a little cushion of wood fixed with three wooden pegs, intended to protect the rudder from injury by knocking or getting against the side of the boat, and at the top there is a loose piece with two handles.

"The thwarts (Fig. 103) were strengthened by two angular boards underneath (Figs. 104, 105) and supported by three perpendicular pieces of wood. Only in one place, by the middle thwart, these boards were tolerably well preserved, but even there the ends were so soft as not to admit of any very complete examination, and it remains uncertain in



FIR-BOAT FOUND IN NYDAM MOSS, SCHLESWIG, GERMANY.

a, Side view of bottom plank; *b*, same seen from above; *c*, *d*, *e*, transverse sections; *f*, supposed outline of spur.

(Copied from C. Engelhardt's "Denmark in the Early Iron Age," p. 36.)

what way they were fixed to the sides of the boat. A wickerwork mat covered the bottom of the boat.

"The fir boat (Pl. LXXV) was tolerably complete when first discovered, and its different parts were brought on shore during the next following day after it had been laid bare and the contents taken out on the 27th

Fig. 102.
RUDDER OF NYDAM BOAT.

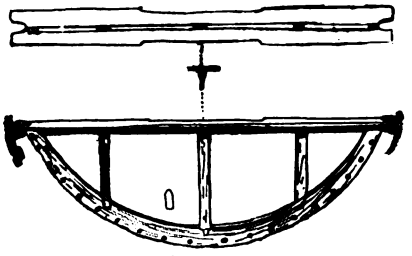


Fig. 103.
THWARTS IN NYDAM BOAT.

(Copied from C. Englehardt, "Denmark in the Early Iron Age.")

October, 1863. In order to protect the timber of this boat until the restoration of the oak boat could be finished, it was covered over with peat, but before anything could be done to save it, the country was occupied by hostile armies. Since then parts of it have been carried away, and the last remnant will probably soon be destroyed and disappear. Sketches of the most remarkable parts of this boat are shown in plate LXXV.

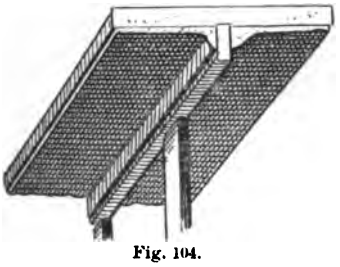


Fig. 104.

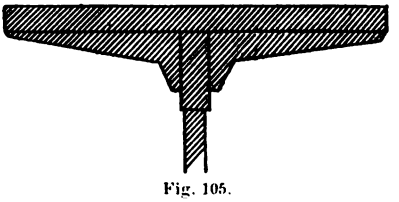


Fig. 105.

THWART SUPPORTS.

Copied from C. Englehardt, "Denmark in the Early Iron Age."

"The bottom plank was about 51 feet, 4 inches long and ended in two points which probably carried long and pointed iron spurs; if so, these spurs must have been *under water.*

"The side planks have clamps ornamented with mouldings, and cut out of the same piece of timber as the planks, just as in the two oak boats. The shape of the rowlocks is somewhat different, and they have formed a continuous row along the gunwale (Fig. 106).

"In this boat, as in the oaken boat, the planking was tied to the ribs by ropes passing through the holes in the clamps, and the principle of construction was the same; the great peculiarity of the fir boat being the terminal prolongations of the bottom plank, which probably have carried iron points—a dangerous weapon of attack, equally fit for sinking an enemy's vessel or holding it firm while being boarded.

"As in the oaken boat the bottom was covered by a mat of wickerwork. In several places the timber had cracked, and been repaired by patches of wood. On the inner surface there are vestiges of the calking material, consisting of woven stuff, and a pitchy kind of substance similar to that used for fixing the feathers on arrows.

Fig. 106.
FIXED OAR CLAMP IN NYDAM BOAT.
(Copied from C. Englehardt, "Denmark in the Early Iron Age.")

"The boats here described I consider to have been mere rowing boats, not destined to carry sails, and in forming this opinion I rely principally on the fact that neither masts nor any signs of rigging have been discovered, nor any arrangements in the boat for fixing the necessary ropes. It is true that in the middle of the bottom plank of the oak boat, as well as of the fir boat, there is a hole of about 1½ inches diameter; but these holes are too small to have carried masts, and may have served for letting out water when the boats were hauled on shore, as was probably the case at the beginning of the winter.

"As I have stated before, the oak boat had been intentionally sunk by means of large holes cut in one of its sides below watermark; at the same time it had been caused to lean over on that side which was nearest the shore, that is, on the northeastern side. Beside this, the stemposts had in course of time detached themselves from the bottom plank leaving a large opening at each end. All these circumstances had necessarily caused a great part of the contents of the boat to float or drift out of it. But a part remained, and showed in several respects an intentional arrangement, objects of the same kind being accumulated into heaps at particular places."

In Nydam Roman denari were discovered, embracing the period of from 69 to 217 of our era, and of the following emperors and empresses: Nitellius (1), Hadrian (1), Antoninus Pius (10), Faustina the Elder (4), Marcus Aurelius (7), Faustina the Younger (1), Lucius Verus (2), Lucilla (2), Commodus (5), and Macrinus (1). The latest of these coins was minted in A. D. 217.*

* Obs: Laureate head, Imp[erator] C[aius] M[arcus] Opel[ius] Sev[erus], Macrinus Aug[ustus], Rev. Pont[ifex], Max[imus Tr[ibunitia], P[otestate], Co[n]s[ul], P[ater] P[atriæ]. Jupiter standing, a spear in his left hand, and the thunderbolt in his right.

They give us an approximate date for the object with which they were found. Allowing some time for their transport from southern countries, the deposit in the peat bogs can not have taken place before about the middle of the third century.

All the known coins from discoveries of this age—from mosses, graves, and chance finds—are of the first three centuries of the Christian era; the latest known is of Macrinus (A. D. 217). Among them the Antonines are of most frequent occurrence.

An analysis of the Nydam boat would give us the following interesting table:

Length between stems	feet and inches	69	6
Length of keel	do	48	0
Width above gunwale amidships	do	10	8
Perpendicular depth from gunwale to bottom	do	3	10
Draft at middle of keel	do	2	3
Draft at ends of keel	do	2	3
Gunwale above water in the middle	do	1	10
Gunwale above water at the stems	do	4	8
Length of uppermost water line	feet and inches	58	0
Width of uppermost water line	do	8	6
Area of uppermost water line	square feet	333	
Area of middle rib	do	12	
Displacement in cubic feet	cubic feet	443	
Displacement center before the middle	tons	14	
Number of oars on each side		14	
Distance between oars	feet and inches	3	6
Middle oar above surface of water	do	2	1
Length of middle oar	do	11	0
Entire crew		40	
Weight of crew, weapons, and provisions	tons	7	
Weight of ship and equipment	do	7	

Prof. Handelmann[1] and Admiral Werner[2] recognize in this boat the only well-preserved specimen of the oldest German ship, basing their claim on the traditions that during the third and fourth centuries Saxon pirates had repeatedly harassed the coasts of the Roman provinces of Gallia and Brittany, and that the coins found in the boats point to about that period.

Admitting the piratical excursions of the Saxons, our knowledge of their naval architecture (as shown on page 549) does not justify the acceptance of such hypothesis, most especially since the boats of the Nydam type in general appearance point to the ship of the Scandinavians (Suiones), explicitly described by Tacitus as being so entirely different from the Roman ships, which, in comparison with the primitive ships of the coast inhabitants of Germania, had attained a high degree of perfection. A navy that produced ships of the Nydam pattern must

[1] *Handelmann, H.:* Nydam boat; Das älteste germanische Seeschiff. In Correspondenzblatt d. Deutsch. Ges. f. Anth. No. 12, Decbr. 1871, p. 95.

[2] *R. Werner:* Das Seewesen der Germanischen Vorzeit. In Westermann's Illustrirte Monatshefte, October, 1882.

have been the growth of centuries before the times of Tacitus; it is also an historical fact that the fleets of powerful nations do not remain idle, and we thus may infer that the Suiones navigated the sea long before the time of Tacitus; it is not at all improbable that in following the coast they extended their journeys to Brittany and Gallia.

The Roman writers after Tacitus mention the naval expeditions of the Saxons and Franks, whose names do not occur in Tacitus, hence, summing up all the preceding considerations, it is not improbable that they are the identical people whom Tacitus described as the Suiones and who included all the tribes of the North beyond the line of Roman conquests.

Sagas.—The second and more recent record of the people of the North is found in the sagas. With reference to these Laing[1] says: "It does not appear that any saga manuscript now existing has been written before the fourteenth century, however old the saga itself may be. It is known that in the twelfth century Are, Frode, Sæmund, and others began to take the sagas out of the traditionary state and fix them in writing, but none of the original skins appear to have come down to our time, but only some of the numerous copies of them." It is also stated that Saxo Grammaticus has depended on many Icelandic sagas which had then not existed in writing.

Extensive bibliographies of the saga literature are given in the Heimskringla and in other works.[2]

The extent of the Northern saga literature being comparatively little known I reproduce here a bibliographical list as given by Rasmus B. Anderson in his latest revision of the Heimskringla. As stated by him "the list is taken from that given by Thormod Torfæus in his 'Series Dynastarum et Regum Daniæ,' from that given by Müller in his 'Sagabibliothek,' and from that of Biorn Haldorson. The notes on the date and contents are extracted chiefly from Müller's work. The

[1] Heimskringla, translation by Laing I, 23.

[2] *Snorre Sturlason:* Heimskringla (Laing's translation) I, 17. *Burton:* Ultima Thule I, 237. *Baring-Gould:* Iceland, its scenes and sagas. London, 1863. Appendix D. *Karl Maurer:* Ueber die Ausdrücke altnordisiche, altnorwegische und isländische Sprache. München, 1867 (also in Abh. K. B. Akad. d. Wiss.). *G. P. Marsh:* Translation of P. E. Müller's 'Origin, progress, and decline of Icelandic historical literature' (in the Amer. Eclectic, N. Y., 1841, vols. I, II). *Lindblohm:* Translation of Bishop Troll's Letters sur l'Islande. Paris, 1781 (cf. *Pinkerton's* Voyages, vol. I). *Chavanne:* Bibliography of the Polar Region, p. 95. *Geo. H. Boehmer:* Bibliography of the volcanoes, earthquakes, and geysers of Iceland, p. 513. *Solberg's* list of illustrative works appended to *Anderson's* version of *Horn's* list of the Scandinavian North. *Poole's Index*, p. 622, and supplement p. 214. A Compendious History of the Goths, Swedes, and Vandals, and other northern people. London, 1650 and 1658 (translated from the Latin of Olaus Magnus). *Srearikes Historia:* Stockholm, 1746–'62. *Mallett's* Northern Antiquities. London edition, 1847. *Wheaton:* Northmen. *Xarier Marmier:* Histoire de l'Islande. *Dahlmann, F. C.:* Geschichte von Dänemark, 1840–'43. *Geijer, E. J.:* History of Sweden, English translation, London, 1845; German translation, Hamburg and Gotha, 1832–'57.

words *historical* or *fabulous* indicate only that the work is founded on facts apparently or is a work of fiction. The editor has consulted in this connection 'Catalogus Librorum' and the 'Verzeichniss,' by the learned Prof. Theodor Möbius of Kiel, and Gudbrand Vigfusson's edition of Cleasby's Icelandic-English Dictionary and his edition of Sturlunga Saga.

Adonius Saga (of a king and duke in Syria). Fabulous.

Alafleks Saga (of a son of a King Richard of England). Fabulous.

Alexander Mikla Saga (of Alexander the Great, translated by Bishop Brand Jonson, by order of Hakon Hakonson). Historical.

Amicus Saga ok Amilius (of Amicus and Amilius, belongs to the story of the Seven Wise Men). Fabulous.

Amloda Saga (of Hamlet, freely translated from Saxo). Fabulous.

Andra Rimur (rhymes of or concerning Andreas).

Ans Saga (of an Buesvinger). Mythologico-historical.

Arna Biskups Saga (of Bishop Arne, flourished 1260). Historical.

Arons Saga Hiorleifssonar (of Aron, son of Hiorleif). Historical.

Asmundas Saga vikings ins Ireska.

Bærings Saga fagra (of the beautiful Bæring, a Saxon king). Fabulous.

Bandamanna Saga (of the confederates—account of an Icelandic law-process in the eleventh century). Local history.

Bardar Saga Snæfelsass (of Bard, son of King Duma, a giant). Fabulous.

Barlaams Saga ok Josaphats.

Bevus Saga (of Bevis, son of an English Count Ginar). Fabulous.

Biskupa Sögur (Sagas of the Bishops). Of these two large volumes have been published by the Icelandic Literary Society.

Bjarnar Saga Hildœlakappa (of Bjorn of Hitdale, a contemporary of Olaf the Saint). Historical.

Blomstrvalla Saga (a translation from the German by Biorn, in Hakon Hakonson's time). The name Blomstrvalla is from a place near Alexandria, where the scene is laid.

Bodvars Biarka Saga. Historical.

Bose ok Herauts Saga (of Bose and Herant). Fabulous.

Bragda-Magus Saga. Mythical.

Brandkrossa Thattr (Traits of Helge Asbiornson of Helge Droplaugson). Fabulous.

Breta Sögur (Saga of Wales, called Bretland; the parts of England occupied by the Anglo-Saxons were called Saxland by the Northmen). This is from Geoffrey of Monmouth's work.

Broddhelga Saga (of a chief who died about 974). Historical.

Bua Saga (of Bue Andredson). Fabulous.

Damusta Saga (of a Damusta who killed Ion, king of a country south of France, and became King of Greece). Fabulous.

Dinus Saga Dromblata (of Dionysius the Proud, son of King Ptolemy, in Egypt).

Draplaugarsona Saga (of the sons, Helge and Grim, of Draplaug). History and fable mixed; the period, the tenth century.

Drauma Jons Saga (of John, the dreamer and Earl Henry). Fabulous.

Edda, Sæmunds (the older Edda). Mythological; English translation by Benjamin Thorpe, London, 1866.

Edda, Snorres (the younger Edda). Mythological; translated into English by R. B. Anderson, Chicago, 1880.

Edwardar Saga hins helga (of Saint Edward of England).

Egils Saga Einhenda ok Asmundar (of Egil the one-handed and Asmund). Fabulous.

Egils Saga Skallagrimssonar (of Egil, son of Skallagrim). Historical; period, from the middle of the ninth to the end of the tenth century. Translated into English by Daniel Kilham *Dodge, PH. D.*

Eiriks Saga Randa (of Eirik Red, who discovered Greenland and Vinland or America). Historical; period, from near the end of the ninth to the beginning of the tenth century.

Eiriks Saga Vidforla (of Eirik, the wanderer, who goes in search of the land of immortality). Mythological.

Elis Saga (of Elis or Julius and Rosamund). Translated from the French, 1226, by Monk Robert, by order of Hakon Hakonson.

Eyrbyggia Saga (of Thorgrim, whose forefather, Rolf, came from the Isle of Moster in the west of Norway, and first planted Iceland with people from his island (eyrbyggia, isle-settlers) to escape Harald Harfager). Historical; period, from the first colonizing of Iceland to the middle of the eleventh century.

Færeyinga Saga (of the Farcys). Historical.

Fertrams Saga ok Plato (of Fertrams and Plata, sons of King Arthur). Fabulous.

Finboya Saga hins ramma (of Finboge the Strong). Fable and history; from the middle of the tenth to the eleventh century.

Flateyar-bók (the Flatey Codex, so called from the Isle of Flatey in Breidafiord in Iceland, in which the manuscript was discovered in 1650. The annals end in 1395. It contains many sagas transcribed into it, and is considered a most important historical collection).

Floamanna Saga (of a Thorgil and his ancestors, original settlers in Iceland, and of his adventures in Greenland. Thorgil died in 1033). Historical.

Flores Saga ok Blankiflur.

Flovents Saga (of Flovent, King of the Franks, inscribed by Master Simon in Lyons).

Fostbrædra Saga. Historical.

Fridthiofs Saga (of Fridthiof the Bold.) This beautiful story has been the groundwork of several poetic and dramatic imitations, of which Bishop Tegner's in Swedish, has been translated into English. [See Anderson's "Viking Tales of the North," which contains Tegner's poem in English and a translation of the original sagas.]

Gautreks Saga. Mythical.

Gibbons Saga (of Gibbon, son of the French King William).

Gisla Saga Surssonar (of Gisle, the son of Sur. Events, of the tenth century in Iceland). Historical. Translated into English by G. W. Dasent. Edinburgh, 1866.

Gonger-Hrolfs Saga (of Rolf Ganger, the conqueror of Normandy). Historical.

Grænlendinga Thattr (events in Greenland from 1122, and a list of nine bishops and fifteen churches). Historical.

Gragas (Gray Goose). A collection of the laws of Iceland. Edited and translated into Danish by V. Finsen.

Grettis Saga (of Gretter the Strong). Adventures, fabulous and historical, mixed, of Gretter and his forefathers in the ninth, tenth, and eleventh centuries. Translated into English by Magnüsson and Morris. London, 1869.

Grimsa Saga lodinkinna (the Saga of Grim Shaggy-Chin).

Gudmundar Biskups Saga (of Bishop Gudmund) being part of the third book of the Sturlunga Saga, or account of the Sturlung family, which ends 1264, and of which the first books are supposed to have been written in 1201.

Guimars Saga (of Guimar, an English knight).

Gullthoris Saga (of Gold Thorer, or Torskfindinga Saga). Fabulous.

Gunlaugs Saga Ormstungu (of Gunlaug the Serpent-tongued). Historical; the period about 1006. Translated by Eirikr Magnüsson and William Morris, in "Three Northern Love Stories." London, 1875.

Gunnars Saga Keldugnupsfifls (of Gunnar the Idiot). Fabulous.

Gunnars Saga Thidrandabana (of Gunnar, who killed Thidrande). Historical; supposed to be written about the end of the twelfth century.

Hænsa Thoris Saga (of Thorer, the hen merchant). Historical.

Hakonar Konungs Saga Hakonasonar (of King Hakon Hakonson) who was born 1203 and died 1261. Historical; by Sturle Thordson, a contemporary.

Hakonar Saga Ivarssonar (of Hakon Ivarsson). Historical.
Halfdanar Saga Bronufostra (of Halfdan, foster-son of Bran). Fabulous.
Halfdanar Saga Eysteinssonar (of Halfdan, son of Eystein). Fabulous.
Halfs Saga (of Half, who, if not altogether a fabulous personage, lived about the eighth century, or in the sixth according to others.
Halfredar Saga Vandrœdaskalds (of Halfred "the Skald, desperate or difficult to deal with," who lived in King Olaf the Saint's time. Historical.
Haralds Rimur Hringsbana of Harald, who slew Hring).
Haralds Rimur Kvingiarna (Rhymes of or concerning Harald the Woman-lover).
Hararrar Saga Isfirdings (a tragic tale). Historical.
Hemings Thattr (of Heming, a fabulous personage of Olaf the Saint's time).
Herrarar Saga (of Hervar). Mythological.
Hialmters ok Olvis Saga (of Hialmther and Olver). Fabulous.
Hogne ok Hedins Saga. Mythological.
Holmverja Saga. Mixed fable and historical facts regarding Iceland.
Hrafnkels Saga Freysgoda. Historical; of Harald Harfanger's time.
Hrafns Saga Sveinbiarnarssonar (of Hrafn, son of Sveinbiorn.)
Heidarviga Saga.
Hrims ok Tryggva Rimur.
Heimskringla (the work by Snorre Sturlason.) Historical. This work has been translated into many languages.
Hrolfs Saga Kraka (a collection of Sagas, some historical, some fabulous).
Hrolfs Saga Gautrekssonar (of Hrolf, son of Gautrek). Mythological.
Hrolfs Saga Skuggafifls (of Hrolf, son of Skugge the Idiot).
Hrolfs Saga Kraka ok Kappa hans (the Saga of Hrolf Kraka and his heroes).
Hromundar Saga Greipssonar. Fabulous.
Hungrvaka (the Hunger-waking; is the name of a saga of the Bishops of Skalholt down to 1178; the author supposing it would raise an appetite for more).
Illuga Saga Gridarfostra (of Illugo, foster-son of Grid). Fabulous.
Isfirdinga Saga (of a division of Iceland called Isfirding). Historical.
Islendingabók Ara Froda (Book of Iceland, concerning the first colonization of Iceland, the introduction of Christianity, etc., usually called Are Frode Schedæ; written about 1120). Historical.
Ivents Saga Artuskappa. Fabulous; translated from the French by order of Hakon Hakonson.
Jarlmanns Saga ok Hermanns (of Jarlman and Herman). Fabulous.
Jarnsida (the law of Iceland from A. D. 1172–1280).
Jokuls Thattr Buasonar (of Jokul, son of Bue). Fabulous.
Jomsvikinga Saga (of the Vikings of Jomsburg, in the Island of Wollin or Jom). Historical.
Jonales Rimur (Rhymes of Jonales).
Jons Biskups Saga (of John the Bishop, viz, Jon Ogmundson, who died 1121, Bishop of Skalholt). Historical.
Jons Saga Leiksveins (of John the Juggler). Fabulous.
Jons Saga Baptista (of John the Baptist).
Jonsbok (the Icelandic code of laws of A. D. 1280, and still in use in Iceland).
Kallinius Rimur (Rhymes of Callinius).
Karlamagnus Saga (of Charlemagne).
Ketils Saga Hœngs (of Ketil Haeng). Fable and history.
Kirialax Saga (of the Emperor Alexis, viz, Kurios Alexis; but this is a fabulous emperor).
Klarus Sago Keysarasonar (of Clarus, son of the Emperor). Fabulous.
Knytlinga Saga (of the Danish Kings of the Canute Dynasty, from Herold Gormson to the Canute VII, supposed to be Olaf Thordson, who died 1259). Historical.
Konrads Saga Keysarasonar (of Konrad, son of the Emperor).

Koung-skuggsja (the King's Mirror). A didactic scholastic work.

Kormaks Saga (of Kormak the Skald). Fable and history.

Kraks Spa (Prophecy of Krak).

Kristinrettr (Ecclesiastic Laws, of which there are several collections).

Kristni Saga (of the introduction of Christianity into Iceland, from 981–1000). Historical.

Kroka Refs Saga (of Ref the Cunning). Fabulous.

Landnámabók (events in Iceland from the original settlement in the ninth to the end of the tenth century; with names of the first settlers, and of their lands, to the number of about 3,000 names of persons, and 1,400 of places; supposed to be written in the last half of the thirteenth century). Historical.

Langfedgatal (series of dynasties and kings in the North). Historical.

Laurentius Biskups Saga (of Bishop Laurence, who was born 1267). Historical, by a contemporary.

Laxdœla Saga (of the decendants of Aud, who settled in Laxdale). Historical.

Liosvetninga Saga (lives of the descendants of Thorgeir and Gudmund, and their own lives, between the middle of the tenth and end of the twelfth century). Historical; written about the end of the twelfth century.

Magnus Saga Orkneya Jarls (of Saint Magnus, Earl of Orkney, who was killed 1110). Historical.

Margretar Saga (of Margaret and Sigurd, in Magnus the Good's time).

Mariu Saga (of Mary, viz, the Virgin).

Mirmans Saga (of Mirman, a king in Sicily). Fabulous.

Mottuls Saga (of the magic cloak at the court of King Arthur).

Nikolaus Saga Erkibiskups (of Nicholas, Archbishop of Lucca).

Njals Saga (of Nial). Historical; and supposed to be written by Sæmund Trove, in the eleventh century. The Saga of Burnt Njal is translated into English by G. W. Dasent. The title is "The Story of Burnt Njal; or Life in Iceland."

Nornagests Thattr. A mythical story.

Œlkofra-Thattr (A comical tale-telling how Thorkel, nicknamed Alchood, brewed the beer at the althing). Historical.

Œrverodds Saga (of Od the Archer; literally, Arrow-Od). Fabulous.

Orkneyinga Saga (Saga of the Orkney Isles). Translated into English by Jon Hjaltalin and Gilbert Goudie, and edited, with notes and introduction, by Joseph Anderson. Edinburgh, 1873.

Pals Byskups Saga (of Bishop Paul, the seventh bishop of Skalholt, who died in 1211; probably by a contemporary). Historical.

Parcevals Saga (of Parceval, one of King Arthur's worthies). Fabulous.

Partalopa Saga.

Petrs Saga Postola (of Peter, the Apostle).

Ragnars Saga Lodbrokar (of Ragnar Lodbrok). History with fable.

Reinalds Rimur (rhymes of Reinald and Rosa).

Reykdœla Saga (a story of the feud between the good chief Axel and the evil Vemund Koger). Historical.

Salusar Saga ok Nikanors (of Saul and Nicanor, two foster brothers, one of Galatia and one of Italy). Fabulous.

Samsons Saga Fagra (of Samson the Fair). Fabulous.

Sigurdar Saga snarfara.

Sigurdr Saga Thegla (of Sigurd the Silent, son of King Lodver, in Saxland). Fabulous.

Skaldhelga Rimur (rhymes of the Skald Helge).

Skida Rimar (Rhyme of Skide).

Stiornu Odda Draumr (Star Odde, viz, the Astrologer Odde's Dream).

Stufs Thattr (Traits of Stuf, the Skald, who lived in the time of Harald Sigurdson, about 1050). Historical.

Sturlunga Saga (of the family of Sturla, of which Snorre Sturlason was a descendant, from the beginning of the twelfth century to 1284). Historical. Edited with prolegomena, appendices, tables, indices, and maps, by Dr. G. Vigfusson. Oxford, 1878. A superb edition.

Svarfdæla Saga (of Thorstein, who first settled in Svarfdal, in Iceland; and fabulous adventures of his successors). History and fable.

Sveins Thattr ok Finns.

Sverris Saga (of King Sverre, from 1177, when Snorre Sturlason's Heimskringla ends, to King Sverre's death). Historical.

Svinfellinga Saga (the story of the sons of Orm, the noted chief of the Svinfell family). Biographical.

Thidreks Saga (of Dietrik of Bern). The same of the German story.

Thomas Saga Erkibyskups (of Archbishop Thomas of Canterbury). Edited, with English translation, by Eirikr Magnusson. London, 1875.

Thordar Saga Hredu (of Thord the Terrible, who, in 975, left Norway and settled in Iceland). Historical.

Thorleifs Thattr Jarlaskalds (of Thorleif the Skald of the Earls of Orkney). Historical.

Thormodar Saga Kolbrunarskalds (of Thormod Kolbrunarskald). Historical.

Thorsteins Saga Sidu-Hallssonar (of Thorstein, son of Hal o' Side). Historical.

Thorsteins Saga Vikingssonar (of Thorstein, son of Viking). Fabulous. Translated into English by R. B. Anderson, in his "Viking Tales of the North." Chicago, 1877.

Thorvalds Saga Vidforla (tells how Thorvald Kodranson, the far-traveled fellow-missionary and companion of the Saxon Bishop Frederick, preached the new faith to the Icelanders for four years, but in vain). Historical.

Ulfhams Rimur (Rhymes of Ulfham).

Valdimars Saga Konungs (of Valdemar, son of King Philip of Saxland).

Vallaliots Saga (of Ljot o' Vall, an Icelander, the story of the twelfth century.) Historical.

Valvers Thattr (traits of the life of Valver).

Vapnfirdinga Saga (tells of the feuds between the men of Hof and the men of Crosswick). Historical.

Vatnsdæla Saga (of Ketil Thrumr, his son Thorstein, Ingemund and Sæmund, his grandsons, who settled in Vatnsdal, in Iceland.) Historical.

Vigaglums Saga (of Glum, son of Eyjalf, who went to settle in Iceland, 922). Historical. Translated, with notes and an introduction, by Edmund Head. London, 1866.

Viktors Saga ok Blaus (of Victor and Blaus). Fabulous.

Vilhialms Sago Siods (of William of the Treasure, a son of King Richard, in England). Fabulous.

Vilkina Saga (History of the Vilkins). Mythological, and belonging to the Niblung literature.

Vilmundar Saga (of Vilmund and Hierande, a son of a king in Frankland). Fabulous.

Volsunga Saga. Mythological. Translated into English by E. Magnússon and W. Morris. London, 1870.

The lives of saints (*Heilagra Manna Sögur*) many of which are mentioned in the above list, constitute two large volumes, published by C. R. Unger, in Christiania. The *Postula Sögur*, legendary accounts of the lives of the Apostles, have appeared in a large volume edited by Prof. C. R. Unger. A large number of the *Riddara Sögur*, that is, Romantic Sagas, have been published by Dr. Eugen Kölbing, Stras-

burg, and by Dr. E. Cederschiöld, of Lund, Sweden. The old Icelandic literature also abounds in so-called *Rimur*, or ballads, founded on written stories. Many of these *rimurs* have not yet been published. The most of the mythical sagas are published, collected in three volumes, by Prof. C. C. Rafn, Copenhagen."

In 1891 William Morris and Eirikr Magnússon commenced in London, under the name "The Saga Library," the publication of a collection of sagas. At present two volumes have been issued, containing the following sagas: Vol. I. The Story of Howard the Halt; The Story of the Banded Man; The Story of Hen Thorir. Vol. II. The Story of the Ere-Dwellers (*Eyrbyggja Saga*) with the story of the Heath-Slayings (*Heiðarvíga Saga*). Of these the Sagas of the first volume are not mentioned in the foregoing list.

Of the story of Howard the Halt a fragment has been preserved in its older and purer state in pages 145–147 of the Landnámabók.

The story of the Banded Man (*Bandamanna Saga*) is the latest of the independent Icelandic Sagas. According to the editors of the Saga Library (Vol. I, preface p. xxiii) "it has come down in two versions, one evidently written in the north and the other in the west or south of Iceland. The northern text is preserved in the Arnamagnæan vellum 132 fol., which palæographers variously refer to the end of the thirteenth down to the middle of the fourteenth century, and was edited by H. Fridriksson, at Copenhagen, in 1850. The western text is contained in 2845, 4°, in the old collection of the Royal Library at Copenhagen, dating from the beginning of the fifteenth century and was edited by Gustav J. Chr. Cederschiöld, Lund, 1874."

The Story of the Heath-Slaying (*Heiðarvíga Saga*), published in the second volume of the Saga Library is pronounced the oldest of all Icelandic sagas. It is stated[1] that it was purchased by the Royal Academy of Antiquities in Sweden in 1682, through the agency of the Icelander Jón Eggertsson in an incomplete state,[2] and that it now forms part of the Royal Library at Stockholm. In 1722 Arni Magnússon obtained the loan of the first twelve leaves. He had a copy made of them but both original and copy were destroyed, in 1728, in the Copenhagen conflagration; but his copyist, Jón Olafsson, reproduced them from memory. The best edition of the saga is that of Jón Sigurdsson, in the volume of the Islendinga Sögur.

These then are the records from which we obtain the knowledge of the Northmen and of their naval architecture.

Ships.—The name ship (*skip*) appears to have been given to any vessel propelled by oars from benches or short seats[3] that did not extend from board to board, but having a gangway between them[4] through the

[1] Morris and Magnússon: The Saga Library, Vol. II. London, 1892. Preface p. xxv.

[2] Cf. Sturlunga I prolog. cxlvii.

[3] Flateyarbók, I, 396.

[4] Heimskringla, p. 400.

entire length of the ship. According to the older Gula law, benches were not employed upon vessels of less than thirteen oars on each side, and it was from the number of benches on each side (*sess*), not from the number of oars, that the ship received the appellation of a 13, 14, 20, 30, etc., seater and were classed as karve (*karfi*) or longships (*langskibet*).

The Karve (*Karfi*) appears to have been propelled exclusively by oars,[1] although occasional mention is made of carvels with masts;[2] its name occurs in various sagas.[3] An ordinance of 1315[4] mentions the karves as vessels of defense. The karve of Bishop Haakon of Bergen[5] and one built in Nidaros in 1381[6] are the last two of this class of which mention is made.

The Longship (*langskibet*—navis longæ of the Romans) was the war-vessel of the North. In building war ships two classes of workmen were employed, namely, the carpenters who prepared and framed the skeleton, and the boarders who prepared the boards and fitted them to the frames. After the keel had been laid upon the stocks the stem and stern posts were placed in position, together with the knees, ribs, and crossbeams, of which the one by the mast was called *siglubite*, and that aft by the well, *austrbiti*. The planks were then fixed to the frames, but the exact manner in which this was done is not known. They were, however, fastened to each other by iron bolts that were riveted on the inner side. The planks, each tier of which had a distinctive name, overlapped each other, and the tightening was done by the insertion of a layer of oakum, probably of cattle hair. It is thus evident that the vessels were clinker-built, although exceptions may be admitted.[7] Mr. Nicolaysen[8] thinks that all vessels were clinker built, and supports his theory by citing the following well-known ships:

Olaf's *Kathrinar*, *Sunifu*, *Postula*, *Reimar's Suðine*, whose name, derived from suð, suggests the clinker structure, and also by the *Mariasuðen*, built by King Sverre at Nidaros,[9] a ship upon a door pillar at the church of Nesland;[10] the seal of Elif, the Lawyer;[11] the seal of the municipality of Bergen;[12] the seal of Gunnar Raasvein,[13] and a ship mentioned in a testament made in 1430.[14] He also claims[15] that the

[1] *Jal, A:* Archéol. Navale I, 411, 464.
[2] Konungssögur—ed. Unger, p. 190. D. Norv. II, 366.
[3] St. Olaf Saga, c. L. Gretti Saga, c. xx. Egils Saga, c. xxxvi.
[4] Norg. gamle Love, 112.
[5] D. Norv. VIII, No. 131.
[6] D. Norv. II, 366.
[7] *H. Miller:* Søkrigshistoriens vigtigste Begivenheder, p. 4.
[8] Langskibet fra Gokstad, p. 15.
[9] Norske bygn fra fortiden. 3 raekkje pl. v. (cited by Nicolaysen.)
[10] Konungssögur, ed. Unger, pp. 83, 85, 166 (cited by Nicolaysen).
[11] D. Norv. III, No. 47 (cited by Nicolaysen).
[12] D. Norv. II, No. 46 (cited by Nicolaysen).
[13] D. Norv. II, No. 172 (cited by Nicolaysen).
[14] D. Norv. V, No. 419 (cited by Nicolaysen).
[15] Nicolaysen, *Langskibet*, fra Gokstad, p. 15.

first carvel ship in the north was the renowned galley built at Bergen in 1566,[1] but two Sagas indicate the carvel built. One of them states[2] that the beautiful planks of oak were fitted so tight as to represent an appearance as though they were grown together, and the second recounts the building, in 999, by Olaf Trygvason, at Ladehammer, near Drontheim, of a ship "which was larger than any ship in the country, and of which the beam knees are still to be seen." This is the celebrated Long Serpent (*Ormen-hin-Lange*) and an account of it, as given in the Saga, may be of interest.[3]

"The length of keel that rested upon the grass was 74 ells. Thorberg Shafting was the man's name who was the master builder of the ship; but there were many others besides—some to fell wood, some to shape it, some to make nails, some to carry timber [this division of labor and trades in the building of a vessel equal in length to a frigate of forty guns gives us a very interesting insight into the civilization of the Pagans of the tenth century and of the state of the useful arts among them], and all that was used was of the best. The ship was both long and broad and highsided, and strongly timbered. While they were planking the ship it happened that Thorberg had to go to his farm upon some urgent business, and as he remained there a long time, the ship was planked up on both sides when he came back. In the evening the King went out and Thorberg with him to see how the vessel looked, and everybody said that never was seen so large and so beautiful a ship-of-war. Then the King returned to the town. Early next morning the King again returned to the ship and Thorberg with him. The carpenters were there before them, but all were standing idle with their arms across. The King asked what was the matter? They said the ship was destroyed, for somebody had gone from stem to stern and cut one deep notch after the other down the one side of the planking. When the King came nearer he saw it was so, and said, with an oath: 'The man shall die who has thus destroyed the vessel out of envy, if he can be discovered, and I shall bestow a great reward on who ever finds him out.' 'I can tell you, King,' said Thorberg, 'who has done this piece of work.' 'I don't think,' replied the King, 'that any one is so likely to find it out as thou art.' Thorberg said, 'I will tell you, King, who did it; I did it myself.' The King said, 'Thou must restore it to all the same conditions as before, or thy life shall pay for it.' Then Thorberg went and chipped the planks until the deep notches were all smoothed and made even with the rest; and the King and all present declared that the ship was much handsomer on the side of the hull which Thorberg had chipped, and bade him shape the other side in the same way, and

[1] Norske Magas. I, 331, II, 70.

[2] Saga of Fridthjof the Bold, c. 1.

[3] King Olaf Trygvason Saga, Heimskringla text, c. xcv.

gave him great thanks for the improvement. Afterwards Thorberg was the master builder of the ship until she was finished. The ship was a dragon, built after the one the King had captured at Halogaland; but the ship was far larger and more carefully put together in all her parts. The King named her Serpent the Long, and the other Serpent the Short. The long Serpent had thirty-four benches for rowers. The head and the arched tail were both gilt, and the bulwarks were as high as in seagoing ships. The ship was the best and most costly ship ever made in Norway."

The long ships were subdivided into snekka (*snekkja*), skude (*skúta*), dragon (*dreki*), skeid (*skeiδ*), and busse (*buza*).

The descriptions of these varieties are somewhat indistinct and do not permit of a definite opinion as to the real difference existing between a dragon, skeid, or buza. The ship that Harald Hardradi had built at Nidaros, in 1160, is called *skeiδ* and *bussi*, and it is further told[1] that after the king had placed a dragon's head upon its prow it might be called a skeid or a dragon.

The Sagas have preserved accounts of celebrated ships, of which we mention:

(*a*) *Long ships.*—Thorolf Kveldulfsson's ship built in 872–873.[2]

King Olaf's ship "Karlhöfdi"; on her prow was a king's head, which he himself had carved. That head was for a long time afterwards used on ships steered by chiefs.[3]

King Sverre's ship "Hárknifrin" (the razor), of twenty-three divisions,[4] and the "Olafsuδe," wherein six men were placed in each division.[5]

The "Mariasuδe," built by King Sverre in 1182; she had thirty-two divisions and was proportionately large; she was larger than any other ship in Norway at that time.[6]

King Sverre's ship "Ognarbrand," of thirty divisions, built in 1199, and which had a high free board.[7]

Ship "Gullbringen," belonging to Vidkunn Erlingsson, who died in 1183; she had twenty divisions and was proportionately large.[8]

In 1206 Urling Steinvæg, Reider the Messenger, and Earl Philippus, of Tunsberg, built a ship which was "much larger than any ship previously constructed in Norway." She had, what neither before nor

[1] G. Strom: Snorre Sturlason Historieskrivn, p. 252.

[2] Egil's Saga, c. ix; Olaf Trygvason Saga, Heimskringla text, c. lxxix.

[3] St. Olaf Saga, c. xix.

[4] A division, or rúm, was the distance between the rowers' benches; the intervening gangway divided the rúm into half rúms, which were occupied by from 2 to 8 men.

[5] Konungssögur, ed Unger (cit. by Nicolaysen), p. 66.

[6] Ibid., p. 77; Norske bygn fra fortiden. 3 raekkje, pl. v.

[7] Ibid., p. 165.

[8] Flateyarbók, II, 600.

since has been known here, two tiers of holes for the oars; the oars of the upper tier were 9.41 millimeters (31½ feet) long, and "a man must be one of the tallest who, standing on the frames, could, with his battle-ax, touch the ceiling of the deck." Each half division accommodated eight men.[1]

In 1239 Duke Skule built a ship with thirty-six divisions; he called it "Good Friday."[2]

In 1247 King Haakon set out from Bergen in his ship "Dragon," of twenty-five rúms, to meet Cardinal William, of Sabine.[3]

In 1253 Gunnar had the "Korssuðen" built at Ravnsholt in Bohuslen, which was "one of the biggest ships that had been constructed in Norway;" her gunwale was 4.23 meters (14 feet) above the water line.[4]

The ship of Bishop Haakon, of Bergen (1339), had forty-five divisions and was 1.88 meters (6¼ feet) high.[5]

(*b*) *Snekkja.*—In 997 King Olaf built on the sands by Nidelv a long ship, of the snekke kind, high stemmed, with thirty rúms, which he called "Trane."[6]

In 1020 St. Olaf built snekkjas.[7]

Aasbjorn Selsbane, of Thronhjem, owned a snekkja with twenty rúms and accommodating ninety-nine men.[8]

In 1026 St. Olaf built a snekke which he called "Visund."[9]

In 1027 Harald, of Thjøtø, in the battle of Helgeaa, had a ship of twenty divisions, gilded pennant, and white sails ornamented with blue and red stripes.[10]

Eindrid the Young had a snekka of twenty rúm.[11]

In 1247 Cardinal William, of Sabina, used a snekkja while meeting King Haakon.[12]

In 1247 King Haakon used a beautiful snekkja in sending his daughter to Spain to be married.[13]

Erling Skjàlgsson had a twenty-seated snekkja.[14]

(*c*) *Skuta.*—The skutæ appears to have been a fast-sailing war ship of smaller dimensions, probably of fifteen rowers' benches, built for speed, as is indicated by the appellations *lettiskuta* (light skuta) and

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[1] Konungssögur (cit. by Nicolaysen), p. 223.
[2] Flateyarbók, III, 41.
[3] Ibid., III, 166.
[4] Konongssögur, pp. 425, 426.
[5] D. Norv. VIII, No. 119.
[6] Olaf Trygvason Saga, Heimskringla text, c. lxxix.
[7] Heimskringla, ed. Unger (cit. by Nicolaysen), p. 251.
[8] Ibid., p. 355; St. Olafs Saga, c. xxiv.
[9] Ibid., pp. 414,529.
[10] Ibid., pp. 402, 428.
[11] Ibid., p. 784.
[12] Flateyarbók, iii, 161.
[13] Konungssögur (cit. by Nicolaysen), p. 438.
[14] Magnus Erlingsson Saga, c. xxv; Olaf Trygvason Saga, c. cii; St. Olaf Saga, c. lx, cl.

hleypiskuta (running ship),[1] and employed principally for boarding, which was facilitated by the build of their bulwark.[2]

Some of the leading skutas mentioned in the Sagas are:

A fifteen-seated skuta belonging to Eindrid the Young.[3]

A fifteen-seated skuta belonging to Erling Skjálgsson.[4]

A fifteen-seater given by Thorleif to his son Eirik.[5]

(*d*) *Dragon.*—The dragon (*dreki*) received its name from the decorations of the prows, representing the head and tail of some fabulous animal.

The most celebrated dragons handed down in the Sagas are:

That of Thorolf Kveldulfsson, of Sandness, in Nordland, built in 872–873.[6]

Harald Haarfager's dragon, built in 900. Of this it is said that "the King had fitted it out in the most splendid way and brought his house troops and his berserkers on board; the forecastle men were picked men, for they had the King's banner."[7]

The dragon of Chief Rand the Strong, in Sallen, which was "the most beautiful ship in Norway."[8] Her captor, King Olaf, called it "The Serpent" because the sail when filled by the wind would represent the dragon's wings. "It had thirty divisions, but was large in proportion thereto (*mikit at því*). The prow bore a dragon's head and the stern was curved outward in a crook (*krókr*) like a tail (*sporör*); the figurehead, and both curves were gilt."[9]

The ship which King Harald Hardrada had built at Nidaros was of the same size as the Long Serpent, and every part of her was finished with the greatest care. On the stem was a dragon head and on the stern a dragon tail and the sides of the bows of the ship were of gilt. The vessel was of thirty-five benches, and was large for her size and was remarkably handsome, "for the King had everything belonging to the ship's equipment of the best, both sails and riggings, anchors and cables."[10]

The ship which King Eystein had built at Nidaros in 1103 in size and shape was like the Long Serpent which Olaf Trygvason had built.[11] "At the head there was a dragon's head and at the stern a crooked tail,

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[1] Olaf Trygvason Saga, c. lxxxiii, xli. Ingi's Saga, c. i.

[2] Olaf Trygvason Saga, c. xx. Egil's Saga, c. lviii. St. Olaf's Saga, c. cxxxii, cxlix. Magnus Blind's Saga c. v, xvi. Magnus Erlingsson's Saga, c. xxx.

[3] Heimskringla, ed. Unger (cit. by Nicolaysen), p. 799.

[4] Magnus Erlingsson's Saga, c. xxv. Olaf Trygvason Saga, c. cii. St. Olaf Saga, c. lx, cl.

[5] Olaf Trygvason Saga, c. xx.

[6] Heimskringla (ed. Unger cit. by Nicolaysen) p. 192.

[7] Egil's Saga, c. ix.

[8] Harald Haarfager Saga, Heimskringla text, c. ix.

[9] Olaf Trygvason Saga, c. lxxxv; Magnus the Good's Saga, c. xx.

[10] Harald Hardrada Saga, Heimskringla text, c. lxi.

[11] Sigurd the Crusader's Saga, Heimskringla text, c. xxvi.

and both were gilded over. The ship was high-sided, but the fore and aft parts appeared less than they should be."[1]

King Haakon's dragon, used by him in 1247.[2]

The "Mariasuðen," built by King Haakon in 1257, was "the most beautiful ship hitherto built in Norway," and had thirty half divisions.[3]

King Haakon's dragon, used by him in 1263 in his expedition to Scotland, was built entirely of oak, had twenty-seven divisions, and the dragon's head, prows, and stern were all gilded.[4]

The largest dragon ever mentioned is that of Knut the Great; it had sixty pairs of oars, and from the descriptions given it must have been 300 feet long.

(*e*) *Skeid*, which was a fast sailer and occasionlly as large as a dragon; the largest one of this kind is that of Erling Skjálgsson, which had sixty-four oars and carried two hundred and forty men.[5]

(*f*) *Busse*, which appears to have been somewhat similar in size to a dragon; a buza ship is mentioned as having been built on the model of the Long Serpent.[6]

The most prominent busse mentioned in the Sagas is that of Thore Hund of Bjørkø, which was of such height between flooring that it gave room for "barrels of ale of astonishing size."[7]

Harald Hardrada's ship of the same size as the Long Serpent, but with a dragon head fore and aft. It had thirty-five divisions.[8]

King Eystein's busse, built in 1103, of the size and construction as the Long Serpent.[9]

Eindrid the Young's bussa, called the "Draglaun."[10]

In calm weather the ships were propelled by *oars* manned by two, three, or four men, according to their length and the size of the ship, and exceptionally strong men only could handle an oar unaided.[11] In two instances only does the Saga give us an account of the length of the oars, the one[12] being stated at 26 feet, and in the other instance 31⅓ feet is given.[13] Actual finds show the length of oars at 18½ to 19½ feet in length,[14] while oars of small boats[15] exhibit a length of 10 feet.

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[1] Heimskringla, ed. Unger, pp. 591, 592.

[2] Flateyarbok, III, p. 161.

[3] Ibid., III, pp. 196, 197.

[4] Konungssögur, ed. Unger (cit. by Nicolaysen), p. 464.

[5] Olaf Trygvason Saga, c. cv.; St. Olaf Saga, c. clxxxiv; Heimskringla, ed. Unger (cit. by Nicolaysen), pp. 231, 414.

[6] St. Olaf Saga, c. cxliii.

[7] Heimskringla, ed. Unger (cit. by Nicolaysen), pp. 591, 592.

[8] Harald Hardradi Saga, c. lxi.

[9] Heimskringla, ed. Unger (cit. by Nicolaysen), p. 684.

[10] Ibid., p. 774.

[11] Magnus Erlingsson Saga, c. vi.

[12] Frithjof Saga (ed. Tegner).

[13] Konungssögur, p. 223 (cit. by Nicolaysen.)

[14] *Nicolaysen*: Langskibet fra Gokstad, p. 38, Pl. iv, Fig 18; v, Fig. 1; vii, Fig. 13.

[15] *Engelhardt*, C.: Denmark in the Early Iron Age, p. 38, Pl. iii, Figs. 19, 20.

In addition to the oars, mast and sails were used in the propulsion of the ship.

The *mast* was set in an opening made in a large block fixed above the middle part of the vessel, the aperture extending considerably sternward, so as to facilitate its raising and lowering.

The mast was of moderate height and was lowered upon all occasions, such as headwinds, when preparing for battle, or in making harbor, rendering the sail superfluous.[1]

The mast was steadied by ropes passing around the top and lashed to the forepost and by a few shrouds on each side. The hoisting rope passed through a hole below the place where the shrouds met. A wooden parral was used to hold the yard or prevent its being swung outward, while a brace rope was placed at each end of the yard and fastened behind the mast or held by the helmsman.[2]

The sails were square, but their form rendered tacking difficult, and the sailors often preferred waiting for a favorable wind. This is mentioned in the Sagas, especially on occasions where thereby an opportunity was offered to show to advantage an exceptionally handsome sail. It is said of Harald Sigurdson that, wishing to visit Constantinople on his return from Jerusalem, he waited with his fleet one month and a half for a side wind to enable him to display the sails covered with velvet.[3]

They were sewed together with thread and strengthened at their edges by a leech, to which hooks were attached and rings so placed as to receive the sheets when the vessel was to shorten sail.[4] They also had small ropes or reefing points to be used in reefing or shortenin the sails.

The material used for sails was frieze, but ships best equipped for active service employed canvas. For show, beautiful sails were highly prized and often presented to chieftains;[5] designs were painted or embroidered upon them.[6] The dragon "Mariasuðen," built by King Haakon in 1257, had sails embroidered with historic designs.[7] They were often lined with velvet[8] and again double velvet, beautifully woven with red, purple, and gold.[9] White sails are mentioned, striped with blue and red.[10]

Ornamentations seem to have played a very important part in ships and carvings appear upon many trifling objects. The prow was gen-

[1] Konungasögur, pp. 165, 230 (cit. by Nicolaysen); Flateyarbok, III, 41.

[2] Laxdæla, I, c. xviii.

[3] Sigurd Jorsalafari Saga, c. ii.

[4] Ancient Gula law.

[5] Harald Hardradi; Fornmana Sögur, VI, c. 100.

[6] *A. Schultz:* Das höfische Leben zur Zeit der Minnesinger, II, 290 (cit. by Nicolaysen).

[7] Flateyarbok, III, pp. 196, 197.

[8] Sigurd Jorsalafari Saga, c. ii.

[9] Flateyarbok, III.

[10] St. Olaf Saga, clxviii.

erally ornamented with the gilded head of some fabulous animal. Ornamentations are mentioned in many of the Sagas.[1]

The accompanying figures[2] show a number of carvings exhibited upon objects from funeral ships. Fig. 107 is a tiller, Fig. 108 part of a

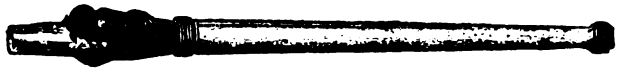

Fig. 107.
CARVED TILLER.
(Copied from N. Nicolaysen, "Langskibet fra Gokstad.")

wooden dish, Fig. 109 the top part of an oar, Fig. 110 wooden fragment of uncertain use, Fig. 111 the carved heads on the end of the verge board from the vessel's tent.

Of *rudders* only one form is known from the Sagas. It was placed on the right side of the ship, which, consequently, bore the name stjørnboard, while the opposite side, back of the helmsman, was called bakboard. In the rear of the helmsman and standing across was an upright wooden bulkhead.

Fig. 108.
CARVED DISH.

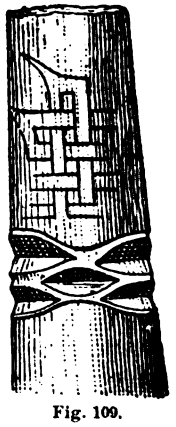

Fig. 109.
CARVED OAR HANDLE.
(Copied from N. Nicolaysen, "Langskibet fra Gokstad.")

The rudder, slightly mounted with iron, consisted of a broad oar,[3] the lower part of which was fastened to the side of the ship by means of a bast rope, while the round neck ran in a hollow cylinder. A square hole in the head admitted the tiller, which was generally taken in charge by the commander of the ship, whose position was a little below the rudder head, so as to secure some protection from the enemy's missiles.[4]

[1] St. Olaf Saga, cc. xlv, cliv; Olaf Trygvason Saga, c. lxxxv; Magnus the Good's Saga, c. xx; Sigurd Jorsalafari Saga, c. xiv; Fornmana Saga, VII, 98; Recenil de chroniques de Flandre, 1837–1841, vol. I; Schiern, Nyere historiske Studier, I, 1875.

[2] Copied from N. Nicolaysen: Langskibet fra Gokstad, Pl. vii, Fig. 7; Pl. ix, Figs. 2, 10a; Pl. x, Fig. 20; Pl. xi, Figs. 1, 4.

[3] Bergens Bylov, IX, 18.

[4] Magnus Barefoot Saga, c. ii; Harald Hardradi Saga, c. xxxii; Olaf Trygvason Saga, c. lxxxvii.

side helm appears to have been the prevailing form of rudder
he fourteenth century[1] (Figs. 112–117), and even at the present
i the Nordland boats, while the rudder itself is hung astern,
ering is done from the side by means of a peculiarly constructed

"But round their ship's side hung their shields.[2]

ı these words of Guttorm Sindre, in singing of Hakon's pursuit of
ons, we learn that the shields, all of one size, were hung around

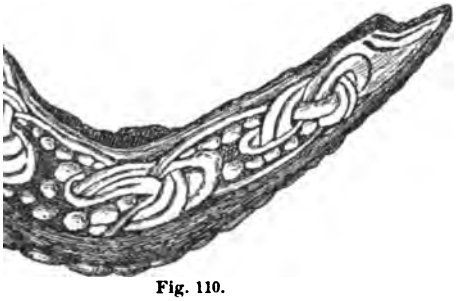

Fig. 110.
CARVED IMPLEMENT.

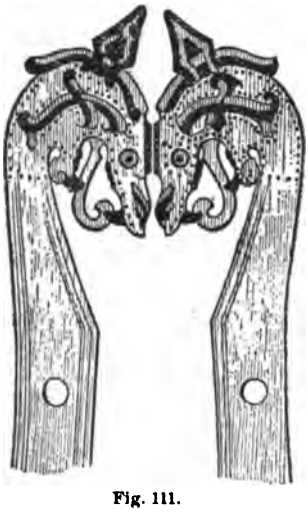

Fig. 111.
CARVED HEADS ON TENT POSTS.

(Copied from N. Nicolaysen, "Langskibet fra Gokstad.")

es of the war ship when not in use.[3] They were placed from a
head of the first oar to a little behind the last, and overlapping
ther they served the double purpose of rendering the ship's sides
and being out of the way when not needed. They formed a dis-
e mark of war ships and were not found upon merchantmen.[4]
attle a circle or burgh of shields was formed around the leader
e standard-bearer, and in land battles the shield burgh appears
e been at the apex of the triangular form of attack.[5]
standards and *weather vanes* are mentioned frequently. The

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ke bygn. fra fortiden, 3 raekkje, Pl. v; Urkundenbuch der Stadt Luebeck
Viollet Le Duc: Diction. d. mobil. franç, IX, 34; Bergens Bylov, IX, 18
A.: Das höfische Leben zur Zeit der Minnesinger, II, 290; D. Norv., II, No.

on the Good Saga, c. xx.
mana Sögur, I, p. 100; Landnama, xi, 3; Grettis Saga, c. xix; Njala, c. lxxxiv;
a Saga, c. xxv.
laf Saga, c. clxviii.
inga Saga, c. xxv. Flateyarbok, I, p. 140; III, pp. 196, 197. Konungs
a, p. 85; St. Olafs Saga, cc. ccxii, ccxxxii. Harald Hardradi Saga, c. ix;
ot, c. ix. Olaf Trygvason Saga, c. cxv, cxx.

standard-bearer stood in the prow of the ship and "the pennant, s by women, played at the masthead of the reindeer of the waters."[1]

In battle the standard-bearer stood by the leader, both surroun by a shield burgh.[2]

The standards were often very elaborately worked[3] and the wea vanes were often adorned with gold.[4]

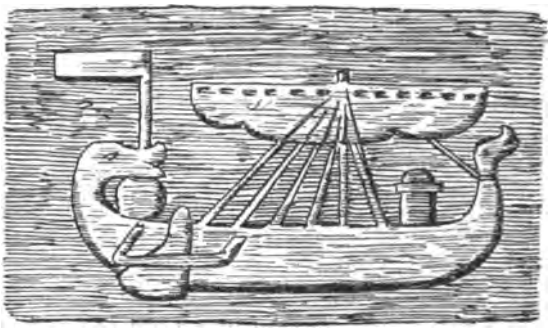

Fig. 112.
SIDE HELM ON BAPTISMAL FONT IN CHURCH OF LÖDERUP. SCANIA, SWEDEN.
(From Du Chaillu, "The Viking Age," vol. II, p. 157, Fig. 936.)

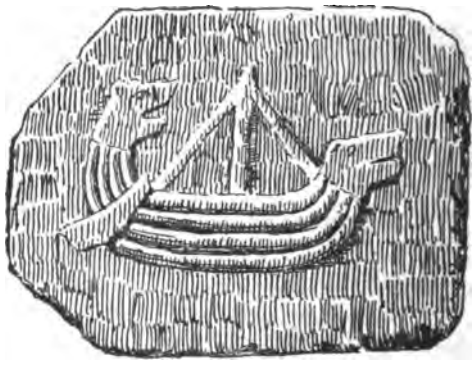

Fig. 113.
SIDE HELM ON SHIP IN STONE WALL AT CHURCH OF SKRÖBELEF, DENMARK.
(From Du Chaillu, "The Viking Age," vol. II, p. 141, Fig. 914.)

For offensive purposes some of the vessels appear to have been pr vided with iron spikes or regular spurs. The former is mentioned the description of the battle between Hakon the Jarl and the Jomsv kings in which it is stated that Eirikr Jarl had a vessel the upp part of which was provided with a *skeg* (beard) apparently consisti of iron spikes.[5]

[1] Knut's Drapa; Orver Odd's Saga, c. viii. Egil's Saga, c. xxxvii; Helgi Hundin bani, ii.

[2] St. Olaf Saga, cc. 48, 212, 233; Flateyarbok, vol. I. Hakon the Good's Saga, c. xxi Harald Fairhair Saga, c. IX. Olaf Trygvason Saga, c. CXV.

[3] Helgi Hundingsbani, c. II.

[4] Orver Odd's Saga, c. 8; Flateyarbok, III, pp. 196, 197.

[5] Svarfdæla, c. 4.

The spur occurs in a boat found in Nydam Moss, Sleswig (Pl. LXXV), and described in the early part of this book. In this boat the ends of the keel plank continued beyond the stem and stern and tapered into points, and it is supposed that these points were covered with iron for use on either side of the ship.

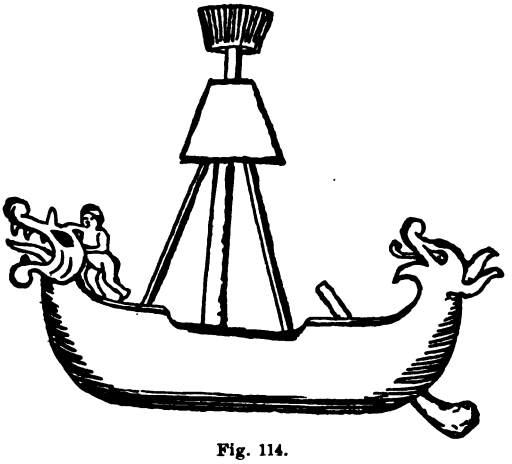

Fig. 114.
SIDE HELM IN A SHIP ON A STONE IN ALSNÖ PARISH, UPLAND, SWEDEN.
(From Du Chaillu, "The Viking Age," II, p. 149, Fig. 915.)

For defensive purposes a war girdle (*viggyrdil*) or war hurdle (*vigkleki*) was placed upon the ship. Their application is not quite intelligible from the few meager accounts given.[1]

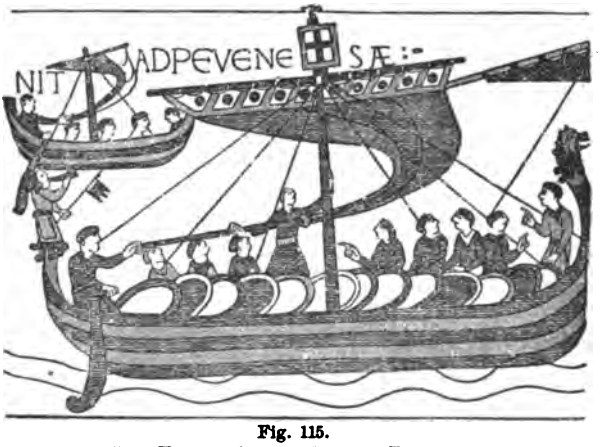

Fig. 115.
SIDE HELM IN SHIP ON BAYEUX TAPESTRY.
(From Edward J. Lowell, "The Bayeux Tapestry," in Scribner's Magazine, March, 1897.)

All the ships of the Northmen of which accounts have been handed down or of which the remains have been found show that they were

[1] "King Sverri had all his ships ready and *war-girdled* at the gangways" (Sverri's Saga, c. 52) and King Harald, pursued by King Svein, of Denmark, ordered the *viggyrdiles* and other things to be thrown into the sea.—Harald Hardradi Saga, c. 35.

provided with a single row of rowers on each side of the ship. One exception, however, is to be noted to this. It is stated[1] that in 1206 "Erling Steinvæg, Reidar the Messenger, and Earl Philippus, of Tunsberg, built a ship which was much larger than any previously constructed in Norway. The ship had, what neither before or since has been known here, two tiers of holes (*hábora*) for the oars between both wells; the oars of the upper rank were 20 (now 15) ells long (9.41 meters=31.37 feet) and a man must be one of the tallest who, standing on the frames could, with his broadax, touch the under side of the flooring." Each half division was reckoned to accommodate eight men.

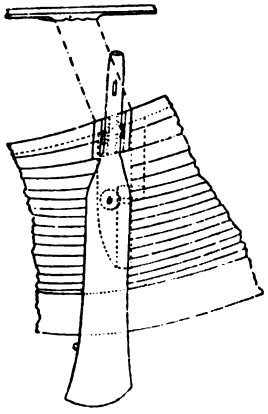

Fig. 116.

RUDDER OF GOKSTAD SHIP.

(Reproduced from N. Nicolaysen, "Langskibet fra Gokstad.")

Fig. 117.

RUDDER OF NYDAM BOAT.

(Reproduced from C. Engelhardt, "Denmark in the Early Iron Age.")

Launching.—In getting the ship ready for the sea it was launched by means of rollers,[2] which appear to have formed part of the equipment and which also were used in dragging the ship ashore as was generally done at night if satisfactory landing could be had;[3] if not, the ship would remain close to shore and be connected with it by means of a gangway.[4] The sail was then lowered and formed a tent under which the men slept.[5]

It has been suggested that the ship received a name when being launched; there appears, however, to be no positive proof of such act in earlier days unless an exception is made in favor of the "Long Serpent."[6] Subsequent to the introduction of Christianity in the North, frequent mention is made of naming a ship at launching.[7]

Burials in ships.—With the exception of the boat found in Nydam

[1] Konungssögur, p. 223.

[2] Ragnar Lodobroks Saga, c. ix; Harald Hardradi Saga, c. lxii; Olaf Trygvason Saga, c. xvii; St. Olaf's Saga, c. 24, 115, 148; Egil's Saga, c. 19, 52, 72; Fagrskinna Saga, c. 42.

[3] Olaf Trygvason Saga, c. 17.

[4] Ynglinga Saga, c. 53; Harald Haarfager Saga, c. 37; Egil's Saga, c. 27.

[5] Svarfdæle Saga, c. 4; St. Olaf Saga, c. 29, 143; Egil's Saga, c. 22, 27; Harald Hardradi Saga, c. 4, 35; Ynglinga Saga, c. 53; Olaf Trygvason Saga, c. 20; Flateyarbok, i.

[6] *Nicolaysen:* Langskibet fra Gokstad, p. 17.

[7] Harald Hardradi Saga, c. 62; Flateyarbok, iii, p. 196, 197; Konungssögur (cit. by Nicolaysen), p. 425, 426.

Moss and described on p. 572 our knowledge of northern ships would be very limited, and rest entirely in the Saga accounts, but for the fortunate circumstance connected with the burial customs in ancient times, in accordance with which the bodies of the more prominent dead were taken to the ship that had been their home during life and surrounded by their wealth became their last resting place. Two methods of burial existed, that of cremating the ship together with its sepulchral inhabitant and a like one in which a mound was erected over the ship and the dead. It is to the latter method that we are indebted for some well-preserved ships, which not alone serve to confirm the Saga accounts, but also extend our knowledge of prehistoric shipbuilding.

The *Voluspa* tells us that "the Asas took the body of Baldr and carried it down to the sea. *Stringhorni* was the name of Baldr's ship; it was larger than any other ship. The gods wanted to launch it for the *burning voyage* of Baldr, but it did not move. Then the *gyg* (Jötun-woman)—in Jötunheim named Hyrrokkin—was sent for. She went to the stern of the ship and pushed it forward at the first attempt, so that fire issued from the rollers."[1] The house of the living thus became the last dwelling of the dead.

In accordance with this law Odin ordered that all dead men should be burned and upon their pyre should be placed their property,[2] and Saga accounts[3] indicate obedience with this order.

The pyre indicated by Odin's law, then, was the ship of the deceased, which, after the body had been consumed, was covered up with earth.

A second form of burial took place in ships without the burning of the body, the ship being covered with a mound. This method was adopted after Fry had been mound-laid (*i haug lagdr*) at Uppsilir, although it is now shown[4] that this tradition can not extend to the erection of the mound, traces and remains of an enormous fire having been found there. The cremation custom, however, was not altogether abandoned, and both methods continued together, as is shown by the occurrence, upon the outer coast of the Trondhjem-Fjord, of the unburned remains found in ship mounds, while upon the inner coast cremation of both bodies and ships has continued. Dr. Sophus Müller places the age of cremation at the beginning of the iron period, and that of inhumation contemporaneous with the Roman invasion of the North, while Engelhardt ascribes the different methods to local customs.

The ship grave of Mökklebyst, Eids Parish, Norway,[5] explored by Mr. Lorange, who beautifully described the ceremony of cremation, offers an illustration of crematories.

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[1] Gylfaginning Saga, c. 49.

[2] Ynglinga Saga, c. 8.

[3] Egil's Saga, c. 61. Hakon the Good's Saga, c. 27. Ynglinga Saga, c. 27.

[4] *Mestorf, J.:* In D. archäolog. Congress in Copenhagen. Hamburg, 1874.

[5] *Lorange, A.:* In Samlingen of Norske Oldsager i Bergens Museum. Bergen, 1876, pp. 153–161. *Lorange, A.:* In Norske Aarsberetning, f. 1874, Taf. VIII, p. 93. *Mestorf, J.:* Ein Grabdenkmal eines altnordischen Seekönigs, in Globus, XXIX, p. 297. *Du Chaillu:* Viking Age, Vol. II, p. 339.

The mound is located in a plain, gently rising from the beach and permitting a full view of the sea, from which it is separated by a terraced formation. It measures 120 by 192 feet. All around it is a ditch, now 12 feet wide and 3 feet deep, which to the south and west is traversed by a bridge-like dam.

The interior of the mound, an oval of 24 by 40 feet, presents two layers, one of bone splinters, intermixed with soil and cinders, and one 8 inches deep, consisting of cinders and burnt remains. Over this a number of objects were strewn, plainly indicating that here a ship had been hauled ashore and gayly decorated with shields around its bulwark, and with arms and utensils of war piled up, had served as the funeral pyre of its commander.

The ship having been consumed, the remains were collected in a flat bronze vessel, together with some personal property of the owner, consisting of two combs, three dices, six chessmen of bone, a disk-shaped bead of dark glass with white wavy lines, a number of broken iron utensils, and an iron arrowhead. The vessel was then covered with twelve shield bosses which, at the time of excavation, had, by incrustation, gradually solidified into one mass and had become attached to the iron so firmly that in order to examine the contents without destroying this unique cover, it became necessary to remove the bottom of the vessel.

The ossuary was placed in an excavation at the bottom of the mound. Above it were piled a horse's bit, spears, swords, shields, and bucklers, all rusted together; eight arrowheads and other iron utensils, possibly coming from the ship's chest, and, wrapped in an untanned goatskin, unburnt animal bones, possibly the portion assigned the dead for his long journey from the funeral feast. The bottom of the mound was strewn with hundreds of ship's nails, mountings, mast rings, anchor hooks, forty-two shield bosses, and other things.

The vessel of enameled bronze appears to be of foreign make. Its ornamentation consists of ring ornaments inserted in and fastened to the bottom by three rivets. The inside of the bottom furthermore shows a three-leaved enameled star and the rim two four-cornered shields. Lorange places it in the younger iron age and sees in it a captured piece of northern French or Belgian make; but Mestorf, in view of the fact that this enamel was not introduced in France until the twelfth century, thinks that it might be considered the product of Rhenish post-Roman manufacture. In point of make and color the enamel resembles that of the Roman enamelled ornaments[1] and also called "Barbarian Grubenschmelz."[2] Enameled ornaments appear in the north at an early date. They are represented in the museums at Kiel and Copenhagen.[3] They have been found north as far as the Stavanger district,

[1] *Von Cohausen* in Bd. 12 Schriften des Nassau' schen Alterthums Vereins.

[2] *Buchner:* Geschichte der Technischen Kunst.

[3] *Engelhardt, C.:* Aarb. f. Nord. Oldk. 1868.

and they serve as proof of an early communication with foreign lands and people.

It may be here stated that the four-cornered shield with "Grubenschmelz" occurs upon fibulæ from the boat-shaped cineraria at Neu Camby and Langensee, in the Slaweck ship, and upon silvered fibulæ from the Wella Kappene (devil's grave) and Wella Krawand (devil's stone heap) near Lake Strante, in Baltic Russia. They are figured by Aspelin in Antiq. fig. 1776, 1778, 1784, 1785, and belong to the first five centuries of the Christian era.

A modified form of these ship burials, in which cremation of the dead alone took place, after which the ashes and bones were collected, placed in a suitable vessel and deposited with other articles in the ship, over which then a mound was raised, is illustrated in

The Borre Ship.[1]—On the road from Horten to Jarlesberg and about one-half a mile from Borre-Prestegaard, Norway, is seen to the right the southern end of Borre Lake, whose banks are so flat at this place that their rise is almost imperceptible. On the ridge toward the north and northeast from the lake lies Horten Gaardene, and on the left side, toward the lake, upon a level, almost barren slope, are about twenty-four mounds of various sizes. There has long been a tradition that the Kings Eystein and Halfdan lie buried in two of the most northerly mounds.

Upon excavating one of the mounds and removing a quantity of sand the workmen, early in 1852, struck some rivets and nails, which led to the belief that it was a ship mound. Several articles were destroyed by the eagerness of the workmen, and the work was temporarily suspended during the winter. The results of the excavation were a lump of bent iron, 2 to 4 feet long and 2 feet broad, much eaten by rust, and of unknown use; next, fragments of an ash kettle of riveted iron plates, and of quite common form, with two ears as handles; a quantity of rivets, often with adherent wood fragments of ship's planks and some even with appended oakum; bones of three horses and one dog, and finally a twisted iron chain with the pieces belonging to it; fragments of a black glass jug with white enameled strips; an iron ax of the oldest type; two bits of iron; fragments of three stirrups, and a pair entire, all of iron, the one covered with thin silver plates and of very ancient form, the other more like those now in use; several fragments of saddles; part of a leather bridle with bits, head gear covered with ornamented plates, and with knobs on the end of the straps, spans, and a small bell. These things were lying somewhat aft of the ship's center, and in such a position that one horse with saddle and bridle (in whose vicinity the ash bucket and glass jug were found) was close

[1] *N. Nicolaysen:* Om Borrefundet, 1, 1852. In Foreningen til Norske Fortidsmindesmaerkers Bevaring Aarsberetning for 1852, p. 25. The description given has been utilized in the above account. Annaler for Nordiske Oldkyndighed og Historie, 1858, p. 186.

to the starboard side, the second horse and dog near the port side, the third horse also on this side, but outside of the boat.

A second excavation was then undertaken with a view of learning particulars of the shape and size of the ship, a point of so much more interest, as little was known of the size of ancient ships.

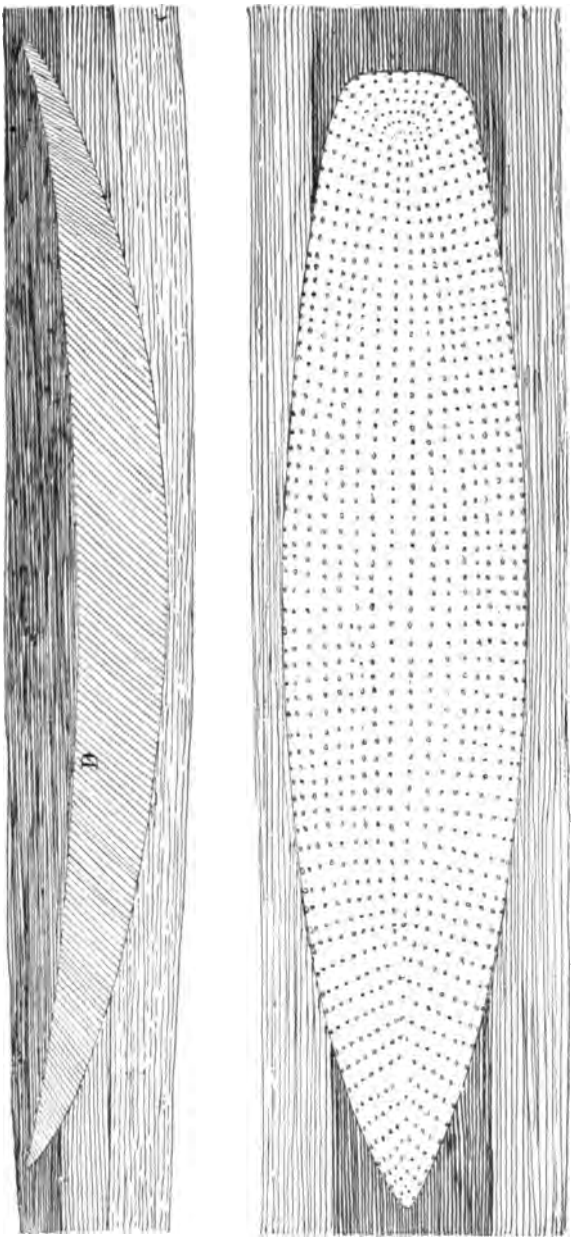
Attention having been called to a layer of coal, about one-half of an inch thick and extending across the mound, and that former finds had first been made at that depth, everything above this layer was removed. Just under the coal layer ship nails were found in both directions, horizontally and vertically; but it was soon discovered that the mound had been so disordered by the first excavation that the present object could not be attained, since the whole aft end, and with exception of about 2 feet distance from the prow, the entire port side, was torn away. It could only be ascertained that the ship stood toward west-southwest and with the prow up toward the land; that by its sharp-built fore part it much resembled the present Sogne or northern coasting vessels, and that it, like those latter, was riveted, four boards in height, each board 8 inches wide. As a tolerably large piece of wood with a nail had before been found, with which also the tar on the outer side and a piece of the oakum between the planks was preserved, the thickness of the latter could be estimated. It came to about 1 inch between the inner side of the nail's head and the riveting plate, but as the head of the nail is driven somewhat within the outer side of the plank, each of them must have been half an inch thick. It was hardly possible to determine the ship's breadth. Its length, from the prow to the hindermost nail, measured 38 feet, and judging from the piece of mound which lay behind this nail, the length of the whole ship can hardly have been more than 50 to 54 feet.

Of other things were found only a fragment of the forementioned glass jug, one of the usual beads of white crystal, probably belonging to a feminine neck ornament, together with a soapstone knob, presumably of a spindle or distaff.

Considering all these circumstances, this funeral seems to have taken place in the following manner: After the place had been determined and the upper layer of earth to the gravel carried away, the ship was dragged up there placed in position, and sand thrown up around it. The interior of the ship was then filled with a finer kind of sand, especially in the vicinity of the articles and animals deposited in it, but so as to leave open a space for the kettle. The litter with the dead bodies was then placed on the flat side of the pile, and after they were burned the ashes and bones were collected, placed in the kettle, and deposited with the other articles in the ship; thereupon the hole was filled with sand and a layer of the remnants of the pyre spread over the whole mound, which was next given its complete form to the top.

According to the Saga,[1] as related by Snorre and his informant,

[1] Ynglinga Saga, c. li.



BOAT FOUND AT SNAPE, ENGLAND.

(Copied from "Proceedings of Society of Antiquaries of London," second series, vol. 2, p. 177.)

Thjodolf,[1] the graves of Kings Halfdan Hoitbein and his son Eystein must be sought for in this locality,[2] and it is therefore not improbable that the mound just described is the one which was raised over the remains of King Eystein, who died about the year 780.

Lackalänga Boat.[3]—While excavating a mound near the river Lackalänga, 1 mile from Lund, Torna district, Scania, the remains of a ship were found, consisting of some pieces of iron and about one hundred iron rivets, which varied in length from 2¼ to 4 inches, all having large heads. Wood was found attached to a few of these nails, but not sufficient to allow of any reliable estimate as to form or dimensions of the ship, which had evidently served as the sepulchre of some important persons, whose bones were found in an urn around which had been deposited the following articles: a sword and belt, bridle, and other parts of a horse's equipment, stirrups, and the jawbone of a dog. The implements much resemble those found in a grave mound near Borre, Norway.

The boat found at Snape, England[4] (Plate LXXVI).—In the vicinity of the village of Snape, Suffolk, England, are located several tumuli of various sizes, and during the months of August, September, and October, 1862, one of these mounds, about 60 by 70 feet in diameter and about 4½ feet in height, was selected for excavation.

Among the objects found therein were several vases containing calcined bones, of which that given in Fig. 118 resembles in form and color the Anglo-Saxon urns described in the plates of Neville's "Obsequies;" the urn in Fig. 119 is considered to be British.

Upon increasing the depth of excavation a few pieces of metal and wood of doubtful character were discovered, but in such poor state of preservation that in scraping the dirt from them they broke. They appeared to have originally been of the thickness and length of a finger, with diameter of head of about the size of a florin, some knobbed rather than flat, and others with a short projecting point. An examination of the broken ones indicated their composition to be laminæ of metal and wood with a bolt through them. Owing to the state of preservation it was decided not to disturb them any more, but to trace them out in the soil, removing the superincumbent earth.

In continuing the excavation what seemed to be a floor of considerable size was uncovered with rows of these knobs projecting at reg-

[1] Ynglinatal.

[2] Norsk Tidskr. f. Vidensk. og liter., IV, 101. Norske Folks Hist., I, 377.

[3] *Bruzelius, Niles G.:* Lackalänga Fyndet-Beskrifning om ett i Skåne anträffadt fynd från jernaldern. In Annaler for Nordisk Oldkyndighed og Historie. Kjöbenhavn, 1858, p. 179. *Bruzelius, Niles G.:* Några fynd af fornsaker fran Bronz-och Jernperioden. In Forhandlinger ved de Skandinaviske Naturforskers. Syvende Möde, 1856, p. 643.

[4] Condensed from *Septimus Daridson's* description in Proceedings of Society of Antiquaries of London, 2d series, vol. II, p. 177. See, also, *Francis Francis* in "The Field," an abstract of which was printed in the Archæological Journal, vol. 20, p. 188.

ular intervals of a few inches. Carefully scraping or sweeping with the hands between the rows, it became apparent that the intervals were of wood, but so disintegrated and crumbling as to be almost of the color of the soil. Further search revealed continuations of these rows at an obtuse angle from the floor upward; and finally the shape of a boat was uncovered, and it appeared that the pieces of metal and wood above alluded to were the rivets used in joining the planks, laid clinker-wise, and that the boat was flat bottomed.

Fig. 118.

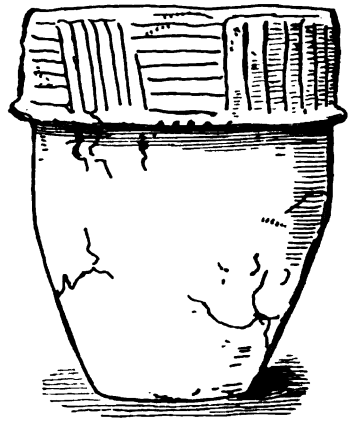


Fig. 119.

URNS FROM BOAT FOUND AT SNAPE, ENGLAND.
(Reproduced from paper by S. Davidson, in Proc. Soc. Ant. London. Vol. II.)

The boat was 48 feet in length, 9 feet 9 inches in width, and 4 feet high. There were 6 rows of rivets on either side and 4 or 5 at the bottom of the boat, and in each row 7 rivets occupied the space of 3 feet. All the rows terminated in 2 rivets, laying one at the stem and the other in the stern. This will be better understood from the accompanying plate of the boat with longitudinal and transverse sections.

Among the articles found in the boat were some human hair of auburn color, a couple of pieces of cloth, a ring, and some pieces of glass. The ring was a thick band of gold with raised center, the sides ornamented with filagree of the later Roman type; and the setting, apparently Anglo-Saxon, held an onyx of dark color, the intaglio being evidently of Roman origin. The general form may be compared to the Saxon rings found at Bossington, Hants,[1] Warkworth.[2]

The glass, of light orange tint, was in minute pieces, and obviously of Anglo-Saxon origin. In its unbroken state it must have resembled the vases found at Fairford, Gloucestershire;[3] at Castle Durham;[4] at

[1] Journal of the British Archæological Association, Vol. I, p. 241.
[2] Archæological Journal, Vol. VII, p. 191.
[3] "Archæologia," Vol. XXXIV, p. 82; Wylie's Fairford Groves, Pl. 1.
[4] Ibid, Vol. XV, Pl. 37.

Reculver, Kent;[1] in Kent;[2] at Chatteris, Isle of Ely;[3] at Selzen, near the Rhine,[4] and at Douvrend, in Normandy.[5]

The most interesting circumstance connected with this find, according to Mr. Davidson, is that a body was deposited in the boat. He says that this has received special mention from Mr. Worsaae, who remarks[6] that no instance of such burial has been brought to light in Denmark, although in Sweden and Norway fragments of wood have been occasionally found in barrows which have been presumed to be portions of boats.[7]

Among the ship graves in which cremation of the dead formed part of the ceremony, Montelius[8] mentions that discovered in 1884 by S. Söderberg and C. Follin upon the island of Oeland;[9] further, one excavated at Ekrem, Romsdale district,[10] and the ship found near Roald's church, in Söndmöre,[11] of which the keel and part of the bottom were well preserved, while of the sides the rivets only were left; aft of the mast a heap of burned bones and two iron axes were discovered. The boat of Björnes, North Throndhjem district,[12] can be traced in outline by the rivets lying in rows as they had fallen out of the sides of the boat; bones, nails, coal ashes, an iron arrowhead, scales of bronze, and glass pearls constituted its inventory.

Of ship burials in mounds without cremation mention is made in the Sagas,[13] and it is to these graves that we must look for confirmation of the various accounts given us of the ships of the people of the north.

A large number of tombs have been brought to light,[14] but in almost every case the woodwork had, for the greater part, decayed by its long rest in the earth, so that but insufficient information would be collected as to the precise form and dimensions of the sepulchral ships or their position relative to the sea.

Only in two cases have the ships, together with their boats, been sufficiently preserved to permit of restoration, and these ships will be

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[1] *Ackermann's* Pagan Saxondom.

[2] Now in the British Museum.

[3] Gent. Mag., 1766, pt. L.

[4] *Lindenschmit:* Todtenlüger bei Selzen; in Coll. Ant., Vol. II, p. 51.

[5] *Cochet:* Normandie Souterraine, p. 399.

[6] *Worsaae:* Primeval Antiquities of Denmark, p. 102.

[7] Guide to North. Antiq., p. 30; Worsaae: Zur Alterthumskunde des Nordens.

[8] *Montelius, O.:* Om högsättning i skepp under vikinga tiden.

[9] *Söderberg, S.:* Beskrifning öfver den undersökningsresa som han 1884 med anslag af Vitterhets Akademien företog på Öland.

[10] Aarsber. for 1880 af Foren. til Norske Fortidsm. Bev., p. 45.

[11] *Lorange, A.:* I Aarsber for 1874 af Foren. til Norske Fortidsm. Bev., pp. 37, 38, 88.

[12] Aarsber. for 1874 af Foren. til Norske Fortidsm. Bev., pp. 47, 48.

[13] An Bogoveigi Saga, c. VI; Hakon the Good Saga, c. xxvii, xxxiii. Laxdæla, c. viii; Landnama, II; Vatnsdæla, c. xxii; Harold Haarfager, c. 42, 45, 46; Olaf Trygvason, Saga c. lxxix; Ynglinga, c. LII.

[14] N. Fornlevn, pp. 20, 179, 245, 551; Aarsber. f. Norske Fortidsmindesm. Bev., 1869, p. 94; 1879, p. 292; 1880, p. 45; *O. Rygh:* faste fornlevn og Oldsager i nordre og søndre Throndhjems Amt, p. 241.

fully discussed later on; they are the Tune ship and the Gokstad ship, both found in Norway.

The Vendel (Upland) boats.[1]—In 1882 Mr. Hjalmar Stolpe, of the Archæological Museum at Stockholm, in excavating a number of graves at Vendel, in Upland, about 40 kilometers north of Upsala, discovered the remains of several boats, of which he published a preliminary report in 1883.[2] The boats were found below the level of the ground, without any mound having been erected over them. Of the boats nothing but the rivets remained, but, as they were lying in regular rows, it was possible to reconstruct the shape of the boats. They were found at different depths, from 2 to 6 feet, one boat in each grave. They were filled up with skeletons of domestic animals, kitchen utensils, etc., in the stem, and amidships the skeleton of a warrior surrounded by his weapons was found; that is, such was originally the arrangement in all the graves, but, unfortunately, most of them had been plundered of their valuables. Only one of the eleven graves was intact; in most cases, however, the rivets were left in their places, the plundering of the graves being confined only to the spot where the warrior and the more valuable pieces of his equipment were to be found. On such spots the rivets were found without any order, from the surface down to the bottom. In all other parts of the boats the rivets were lying in parallel rows, showing very distinctly the shape of a boat or small vessel, sharp at both ends. In most cases nine or ten rows of rivets are to be seen, indicating that the boats were constructed of at least four planks on every side. The rivets are generally about 2 inches in length; only in two boats three larger rivets (about 4 inches) were found close to the stems; in some instances they were connected with pieces of iron bands, but as they were found in the places destroyed by the treasure hunters their use can not now be stated. They may have served in connecting the keel with the sternpost.

In boat 1 the stern was destroyed by laborers in 1881, when the grave was discovered, and the other parts of the vessel were so covered up with skeletons (three horses, one bull, one ram, two dogs, one sheep, two big pigs, etc.) that it was impossible to construct a plan from the rivets *in situ*. From the length of the grave it is concluded that the vessel measured about 30 or 35 feet in length and perhaps 8 feet in width.

No. 2, plundered and destroyed, to conclude from certain facts, by the laborers who built a church close by in A. D. 1300; the boat can not have exceeded 24 feet in length.

No. 3 may have been 25 feet long, but the part left uninjured by the grave-robbers was too much covered with skeletons of animals (the rule is three to four horses on the starboard side, the bull in the stern, and the smaller animals on the port side) to permit the surveying of the rivets; and when the skeletons were broken up the rivets were dislocated.

[1] Communicated by Mr. Hjalmar Stolpe, in a letter of 24th of May, 1892.

[2] Antiquarisk Tidskrift, Vol. VIII, 1883.

The length of No. 4 was about 26.5 feet by 7 feet wide amidships. Four planks to every side.

No. 5, no rivets.

In No. 6 the grave measured 24 feet in length. Severely damaged. Rivets found only along the south side of the grave, over a space 16 feet in length, 3½ feet in width; apparently disturbed.

In No. 7 the boat was very distinct. Length, 29.8 feet; breadth, 8 feet. In the stern 3 large rivets.

In No. 8 the grave is 25.5 long; boat uncertain.

No. 9, the only grave found intact. The boat, 29 feet 8 inches long by 6 feet 5 inches wide. In the middle the skeleton of a man, with two swords, two shields, one adze, one spear, arrows, comb, knife, several chessmen, and half a Kufic coin from A. D. 914 to 943.

In No. 10 the boat was 35 feet 5 inches long, 5 feet 9 inches broad.

In No. 11 the boat was 31 feet long by 6 to 7 feet broad.

As to their age the graves differ very considerably. From the most ancient one, dating from the beginning of the seventh century, there is a coherent chain down to the end of the tenth century, perhaps indicating generation after generation of a chief's family.

Not far from the old burial-place is a lake formerly communicating with other lakes and rivers in the province.

The Björkö boats.[1]—On the island Björkö, in Lake Mälar, the ancient city of Birca, mentioned by Adamus Bremensis as the place where Ansgarius, in the ninth century, preached the Gospel to the heathenish Swedes, and supposed to be identical with old Sigtuna, the remains of two large flat-bottomed boats were found within the wall surrounding the place where the old city once stood. The rivets indicate a size of about 19 feet in length and 5 to 6 feet in breadth. Of their construction nothing could be learned.

In the *Orkneys*[2] the sites of three ship burials have been located as follows:

In 1841, by Mr. George Petrie, in a sandhill in Westray;[3] in 1855 in a mound situated in the bay of Pierowall, and explored by Mr. Farrer;[4] in July, 1863, in a mound in the bay of Pierowall explored by Messrs. Farrer and George Petrie.[5]

The contents of these burial places, however, owing to the nature of the soil did not permit of any details and simply established the fact of having contained ships.

In the *Faroe Islands* no traces of ancient ships have been found.[6]

[1] Communicated by Mr. Hjalmar Stolpe, of Stockholm, by letter of May 24, 1892.

[2] Proceedings, Society of Antiquaries of Scotland, 1879–'80, p. 79.

[3] *Ibid.*, vol. v, p. 16.

[4] *Ibid.*, vol. II, p. 158.

[5] *Ibid.*, vol. v, p. 300.

[6] Communicated by Mr. Louis Bergh, of Thorshavn, March 23, 1892.

Ultuna ship.[1]—In excavating a sandhill at Ultuna, three-fourths of a mile from Upsala, Sweden, two layers of a dark substance were met which were soon discovered to be the remains of the rotten sides, or boards, of an ancient ship. In these layers were found a large number of iron nails from 1½ to 2 inches long, with a round head at the one end, and a square, riveted footpiece on the other, undoubtedly used for holding together the side planks of the ship. The width between the layers was about 8½ feet; their length could be followed 19 feet, but as a part of the hill's edge was formerly dug away, the entire length of the ship can not now be determined. Since the ship's bottom lay about 8 feet below the natural surface level, it must be supposed that a depression was dug in the hill, in which the ship was placed and the hill erected over it. Just on the bottom layer there were found remains of a human skeleton with bones of two horses, buried in the stern of the ship; further forward there were also bones of some domestic animals; a double-edged sword of iron and a large number of articles and ornaments of bronze, iron, and bone were found under a covering of loose stones which had probably formed a tube in the interior of the mound, which had fallen to ruin when the deck, where such was found, had rotted and fallen to the bottom of the ship.

Of mound-settings in ships in which the human remains were buried unburnt, descriptions are given by Montelius,[2] Nicalaysen,[3] and others,[4] and although in most cases the wood has molded away, the outlines of the ship are shown by the numerous rivets deposited in rows, sharply contrasting with the light sand in which the ships have been buried. Among these finds may be mentioned the remains of a boat found in 1853 near Hof, in Dönne's parish, Nordland District, which contained two human skeletons, skeleton of a dog, shield bosses of iron, and near one of the skeletons ornaments of bronze, pins, rings, implements of bone, an iron kettle, glass, pearl, and scissors.[5]

In *Northern Norway* (Trondhjem district) traces of boats have been found in grave mounds, but they were so much decayed that but very few important details have been observed; in fact, the wood was almost everywhere completely rotted, leaving only a couple of brown-colored lines in the gravel. Fragments of frame timbers, knees, etc., have occasionally been found in bogs in a tolerably uncorrupted state, but these seem to belong to more modern times and are of no particular interest as to construction.

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[1] *Hildebrand, B. E.:* Några fynd af fornsaker fran Bronz—och Jernperioden. In Forhandlinger ved de Skandinaviske Naturforskers. Syvende Möde. Christiania, 1856, p. 643. Annaler for Nordiske Oldkyndighed og Historie, 1858, p. 188.

[2] *Montelius, O.:* Om högsättning i skepp under vikingatiden.

[3] *Nicolaysen, N.:* Norske fornlevninger, p. 20, 245, 588.

[4] Aarsber. af Foren. til norske Fortidsmind, Bev. 1871, p. 13.

[5] *Nicolaysen, N.:* Norske fornlevn, p. 681, 682; *Lorange, A.:* Samlinger af Norske Oldsager i Bergens Museum, p. 192, 193.

The following traces of prehistoric boats have been discovered in Trondhjem Amt.[1]

In *Valnesset, Bjugn parish*[2] (63° 50′ N.) a boat was deposited over the dead body, bottom up, 20 to 22 feet long, 6 to 8 feet broad, 7½ inches between the nails which were partly 1¼ and partly 2½ inches long—the latter most likely through the keel and the ribs; was placed in an east to west direction, parallel to the near shore-line, the bow most likely pointing to the west.[3]

In a mound at *Tunnol, Bjugn parish*, were found two rows of nails 6 feet distant from each other. A part of the stem, probably of oak, could be seen in the east end of the mound, with a large iron loop fastened to it. The head of the body eastward. Together with it were here found more objects than in any of the other interments, namely, a silver bracelet, bronze scales, some implements of bone, etc.[4]

On the *Isle of Snotra, Aafjord parish* (63° 54′ N.), four boats, apparently of fir, have been found in four different mounds, 22 to 24 feet long. The iron nails were of the same dimensions and with the same distance between them as above. In one of these the nails were of three different sizes. In one of the mounds the body was deposited with the head towards the east, in the others towards west and northeast.[5]

At *Gravrok, Melhus parish*, about 20 kilometers south of Trondhjem and consequently as far from the coast (while the above-mentioned finds have been made along the coast) a similar boat seems seems to have been deposited in a mound.[6]

Storhaugen ship.[7]—Upon a small plateau formed by Karmisland (Karmoen), about 160 miles from the shore in Avaldsnes Bay, Bergens Stift, Norway, stands a mound in which, in 1887, the remains of a ship were discovered, the antiquity of which appears to date back to the days of the strife in the North between paganism and Christianity.

Oaken boards and other worked pieces of wood found occasionally seemed to indicate the existence of a boat, but as the excavations were carried on unsystematically and the finds represented little, if any, antiquarian value, special attention was not given to the matter until in 1887, when, upon proper representation, systematic excavation was begun under the skillful management of the late Dr. A. Lorange, of the Bergen Museum.

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[1] Kongeliga Norske Videnskabernes Selskabs Skrifter f. 1878 and 1879; Aarsberetning fra foreningen til norske fortidsmindesmaerkers bevaring.

[2] Aarsberetning, etc., 1873, pp. 8, 9.

[3] For this information I am indebted to Mr. K. Lossius, deputy manager of the Archæological Museum of Trondhjem.

[4] Aarsberetning fra foreningen til norske fortidsmindesmærkers bevaring, 1872, p. 36.

[5] Aarsberetning, etc., 1864 and 1874, pp. 16, 17.

[6] Communicated by Mr. K. Lossius, deputy manager of the Archæological Museum of Trondhjem.

[7] *Lorange, A.:* Storhaugen paa Karmøen, Nyt Skibsfund fra Vikingetiden. In Bergen's Museum Aarsberetning. 1887. *Du Chaillu:* Gunnarhaug ship discovered in Bergen Stift in 1887. In Viking Age, vol. II, p. 335.

In the central line of the mound a depression from north to south was observed which continued throughout all the layers and gave evidence of a general caving in in that line of the original structure; and in that line, directly under the depression, the oaken keel of a ship was found in a space formed by two stone walls 3⅓ feet (1 meter) high and broad, set 20 feet (6 meters) apart and running parallel with the keel, which was supported by three pair of stone pillars. At this place too several pieces of pressed and tarred seaweed were found which had served as caulking.

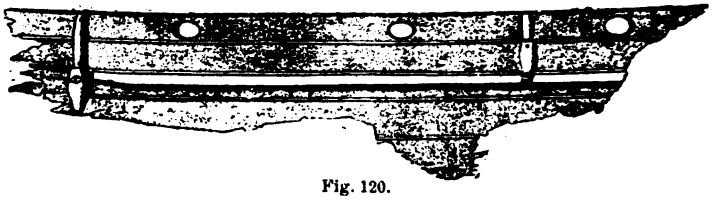


Fig. 120.

STARBOARD GUNWALE OF STORHAUGEN SHIP.

(Reproduced from A. Lorange "Storhaugen fra Karmøen," in Bergens Museum, Aarsber, 1887.)

About 4 feet from the center the two parellel walls were intersected by a third wall, on the south side of which was found the starboard gunwale of the ship in a good state of preservation, two planks, and three short timbers (Fig. 120). On the inner side were the top pieces of two ribs connected by short timbers which appear to have given support to the gunwale; they were fastened with iron nails and also with a rivet of the type found in the Mökklebyst ship. The boards were tongued and grooved and riveted together; the other planks were nailed from the outside. Owing to the absence of floor timbers the ground plan can not now be shown; the finding of a piece of board with a clamp (Fig. 121) suggests a construction similar to that of the other known ships. In the fragment of the top plank are three oval holes about 3 feet apart and evidently intended for the oars. The upper part of a pine oar was found near the ship's side, standing perpendicular, with the handle downward. Another finely smoothened fragment shows two patches fastened with trenails and so carefully joined that it requires an experienced eye to discover them.

Fig. 121.

FASTENING OF PLANKS.

(From A. Lorange, "Nyt Skibsfund fra Vikingetiden," 1888.)

In the southern part of the ship, near the keel, were found the scattered remains of a nimbly built boat, the boards of which, a little more than one-third of an inch in thickness and finely smoothened were joined to each other with clinched nails and tied to the ribs by means of carved clamps (Fig. 122). Along the inner side of the top plank runs a strong

Fig. 122.

CARVED CLAMP.

(From A. Lorange, "Nyt Skibsfund fra Vikingetiden," 1888.)

edging. Over the well-preserved fragments was placed a gangway of fir (Fig. 123).[1]

The inside of the ship was lined with a layer of moss as if to prevent direct contact with the soil of the mound which was to be erected over it; the prow was filled with large lumps of iron rust.

The ship appears to have had a length of keel of 66 feet (20 meters); the width, from the space between the parallel walls, may be estimated at 16½ feet (5 meters). No traces of mast or sailing arrangement having been discovered, it is surmised that the ship was used exclusively for rowing, with a distance between oars of 3 feet, as suggested by the holes in the top plank.

Fig. 123.
GANGWAY.
(From A. Lorange, "Nyt Skibsfund fra Vikingetiden," 1888.)

During the progress of excavation the following articles were discovered:

(1) A shovel formed tool (Fig. 124).

(2) Tool of fir (Fig. 125).

(3) Tool of oak (Fig. 127).

(4) An oaken board 6 feet (1.8 meters) long and 4 inches (0.11 meter) wide, with two notches in the middle and two on one end; this piece is roughly hewn and not planed.

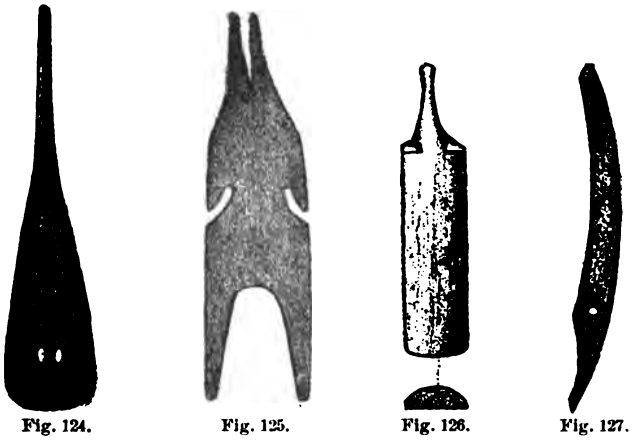


Fig. 124. Fig. 125. Fig. 126. Fig. 127.
TOOLS FOUND IN STORHAUGEN SHIP.
(From A. Lorange, "Nyt Skibsfund fra Vikingetiden," 1888.)

(5) A bat of oak (Fig. 126).

(6) Oar-shaped tool 40 inches long with a short, broad blade.

(7) Club formed tool cut off at both ends.

(8) Two round poles 17 feet and 10 feet long and a little over 4 inches diameter.

[1] Åarbog, Bergens Museum. 1886, p. 72.

(9) Three profiled fragments of oak with ornamented edge.

(10) Several pieces of bast rope.

The observations made would indicate that the vessel had served as the last resting place of a chieftain whose remains were placed in a sepulchral chamber erected over the ship formed of rafters which found a support upon the stone walls beyond the board and erected for that purpose, while the intersecting cross wall gave support to the gable end of the roof. In the chamber thus formed and covered with plenty of birch bark, as shown by the shavings left in the place, the dead was deposited in a sitting or lying position, near the south end of the wall upon which were found two swords, one spear, several blacksmith tools, whetstones, a little box, fire steel and flint, etc.

At the foot of the wall stood an iron pot with a round edge bent over but sadly rusted away; near by two beautiful checkers, a sinker, a waxen tablet bearing the mark of a cross, and a gold buckle.

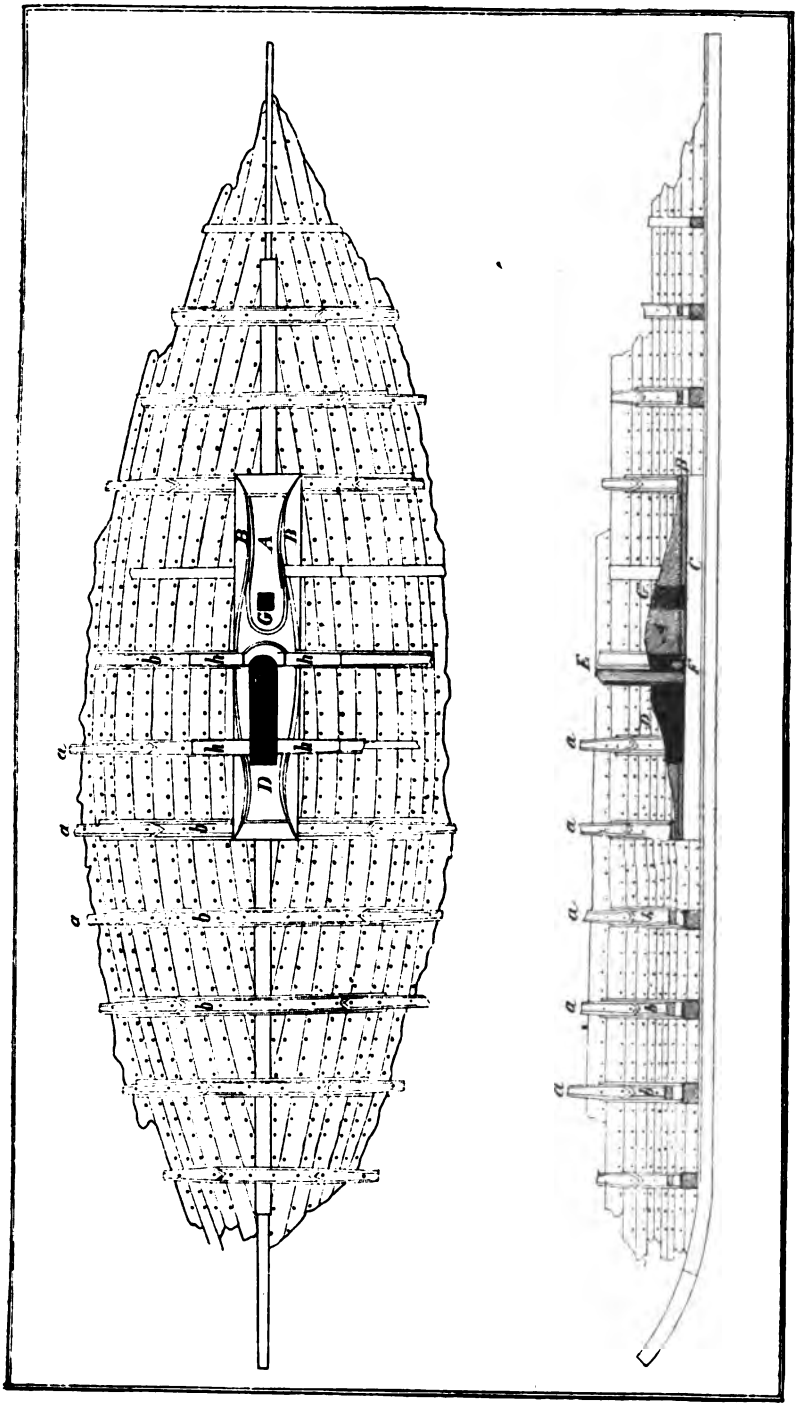
While of animal remains only the accidentally preserved jaw of a horse was found, its occurrence suggests the usual funeral customs observed in other ship graves of that kind, after the completion of which the mound was erected over the entire structure.

The gradual settling of the earth and the enormous pressure exerted thereby upon the funeral chamber resulted in the crushing in of the comparatively frail structure, the earth filling the entire vessel, tearing it asunder and distributing its contents throughout the soil; the absence of human and animal remains may, therefore, be ascribed to the direct contact with the soil into which they, in the course of centuries, became absorbed without leaving any distinguishable traces.

With regard to the antiquity of the ship, tradition connects the place upon which it was found with the battle of Rastarkalv, in which Hakon the Good defended Norway's independency against the Danish king. The saga tells us that after the battle was over the king had some of the ships of Eriksson drawn ashore, placed Egil Ullsaerk and other slain men into it and built them an honorable grave; he had the mound raised over the funeral ship and erected bauta-stones upon the same; and it is, therefore, not impossible that the ship found at Storhaugen is the ship which Hakon "mounded" in memory of the fallen heroes in the year 953.

The Tune Ship[1] (Plate LXXVII).—According to old reports, a ship was said to be buried in a mound located on the farm of Haugen on the Rolfsisland, about three-quarters of a mile above the town of Frederiks-

[1] Skillings Magazine, 1867, pp. 717–719, 724, 738–739. Polyteknisk Tidsskrift, 1867. *Gade, G.:* the ancient vessel found in the parish of Tune, Norway; Christiana, 1872 [employed in the description here given]. *Müller, H.:* Søkrigshistoriens vigtigste Begivenheder, p. 1. *Tuxen, N. E.:* De nordiske Langskibe. In Aarb. f nord. Oldk. og Hist. Copenhagen, 1886. *Parker, Foxhall A.:* The Fleets of the World, New York, 1876, p. 151. *Nicolaysen, N.:* Langskibet fra Gokstad Kristiania, 1882, p. 12. *Montelius O.:* The Civilization of Sweden in Heathen Times; translation by F. H. Woods, London, 1878, p. 185. *Boehmer, Geo. H.:* Norsk Naval Architecture; in Proceedings U. S. National Museum, vol. IX, p. 454.



ANCIENT SHIP FOUND IN PARISH OF TUNE, NORWAY.
(Copied from G. Gade's "The Ancient Vessel found at Tune," 1872.)

stad, and about 600 meters from Visterflo, one of the branches of the Glommen River, in the parish of Tune, which has preserved the most remarkable and probably the oldest of Norwegian Runic stones. Over a century ago excavations had been made in the progress of which the existence of the ship appears to have been determined. Acting on these reports, the owner of the farm, in about 1865, began a search for the ship, and after several ineffectual attempts succeeded in uncovering a part of its inner side. The discovery being reported to the Society for the Preservation of Norwegian Antiquities, the proprietor of the farm desisted from further search and allowed the excavation to be made by Prof. O. Rygh, under the direction of the society.

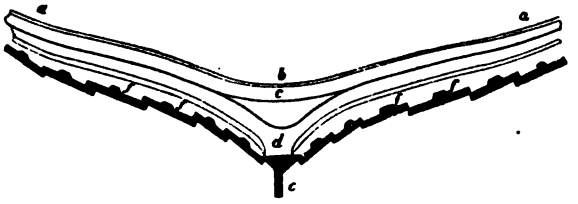


Fig. 128.
CONSTRUCTION OF TUNE SHIP.
(From G. Gade, "The ancient vessel found at Tune," 1872.)

Owing to the circumstance that the ground covered by the mound had been under cultivation for many years, its original shape had been modified, and its former size could not be correctly estimated; it appears, however, to have been round, about 13 feet high, with a circumference of between 450 and 550 feet. It is situated on the slope of a hill facing the river.

The lowest layer of the mound consisted of a stiff clay, and to this is due the fair state of preservation of those portions of the ship imbedded therein; the upper layers consisted of other kinds of earth, and all portions of the vessel surrounded by them had been destroyed, not even a trace remaining. It was best preserved in the middle, where the clay had been thickest; the extremities had suffered considerably, and only the very lowest portions of the prows have been preserved. The pressure of the heavy mass of earth appears to have resulted in the breaking of several of the ribs and in the bending of some of the boards, but the principal parts are fairly well preserved and most of the nails undamaged.

In the mound the vessel stood on a level with the surrounding surface of ground. Both of its ends being almost alike and very pointed, it would have been a very difficult matter to determine which is fore and which aft but for the mast, whereby it became apparent that the northern end is the stern. Its position relatively to the sea, therefore, confirms the many references made in ancient writings that the burial ship was placed seaward or Glommenward, to be ready, under the command of its master, to be launched upon the element that had been its home.

The ship is of oak, clinker built, and is composed of keel, stem and stern posts, frame-timbers, beams, knees, and planking. (Fig. 128.)

The keel, with a length of 45½ feet, is made of a solid piece of oak and is fitted directly to the stem and stern (Fig. 129); the width amidships, owing to the absence of some of the upper planks, can not now be determined accurately, but may be estimated at 14½ feet, with a perpendicular height from keel to bulwark of somewhat over 4 feet.

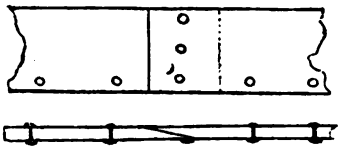


Fig. 129.
CONNECTION BETWEEN KEEL AND STEMS.
(From G. Gade, "The ancient vessel found at Tune," 1872.)

The frames, thirteen in number, are united by crossbeams, and are not fixed to the keel, but lie free above it. On the top of the frames, fitted onto the overlying limbs of the knees and their continuations, rest the ends of the beams, thus forming a ledge for the ends of the bottom boards to rest in. The knees are attached to the beams.

The ribs (Fig. 130) are built of three different layers of wood, of which the upper and lower ones are of oak, the upper one exhibiting molding and carved ornamentations, and a middle layer of fir, which is wider than the others and projects on either side. The relative distance of the ribs

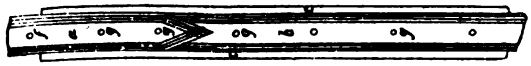


Fig. 130.
RIB OF TUNE SHIP.
(From G. Gade, "The ancient vessel found at Tune," 1872.)

is rather regular, namely, 2 feet 7 inches. The under side of the ribs have been provided with holes, through which the ropes were passed that connected the planks to the ribs.

The ends of the beams rest on the top of the frames, where they are fitted on the overlying lower limb of the knees and its continuations, and as both these are somewhat narrower than the beam, a ledge is formed on which the ends of the bottom boards rest.

The planks (Fig. 131), twelve in height, all ornamented with molding on the edges, are laid in the ordinary manner of clinker-built ships, each upper plank projecting a little over the edge of the lower one. Their width is from 6 to 12 inches and their thickness 1 inch, with the exception of the eighth plank from the bottom, which is more than 2 inches thick.

Where the boards are joined they are cut off obliquely and held together by three rivets having round heads on the outside and square ones inside; they are placed at intervals of from 6 to 9 inches.

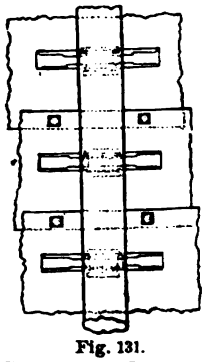


Fig. 131.
FASTENING OF PLANKS TO RIBS.
(From G. Gade, "The ancient vessel found at Tune," 1872.)

Only the bottom plank and the two top planks are fastened to the timbers; iron spikes had been used to fasten the garboard to the keel, and trenails to fix the two upper planks to the knees; all the intervening planks,

although fastened to each other by bolts of iron, riveted together, have been tied to the frames by means of apertures placed at regular intervals, partly in ledges on the frame timbers and partly in cleats projecting from the planks themselves; or, in other words, on the inside of the boards, at every rib, a long clamp had been carved out of the wood; two holes had been made in the clamps and in the under side of the rib a similar one, through which the rope had been run.

It seems surprising that a people so far advanced in the application of the useful arts should have bestowed so much labor on the shaping of the plank without some definite purpose; it would appear to us that this peculiar method of joining had rendered the ship rather weak, although it may, at the same time, have given it more elasticity and increase in speed.

Fig. 132.

BUILDING OF A SHIP.

(Reproduced from Edward J. Lowell, "The Bayeux Tapestry," in Scribner's Magazine, March, 1887.)

As previously stated, the ancient Gula law specified two classes of workmen engaged in the construction of war vessels which the district had to furnish—the carpenters who prepared and framed the skeleton, and the workers on thin boards, who whittled the boards and put them on, and the latter class appears to have been charged with the laborious task of preparing the planks, which, in addition to the cleats, were provided with beaded edges within and without. Figure 132, taken from Edward J. Lowell's paper on The Bayeux Tapestry,[1] illustrates the method employed in shaping the planks.

The tightening of the joints was effected by means of a thin layer of oakum made of cow's hair.

The gunwale being entirely destroyed, the form of tholes can not be ascertained; it may, however, be assumed that they have been of the same pattern as is still in use in the boats on the north and west coast of Norway. The rowlocks of all the Northland boats, from the most ancient to the present Norwegian fishing craft, exhibit the same general model, although they differ from one another in size and details of

[1] In Scribner's Magazine, March, 1887.

work. In every case they are cut out of one piece of timber. The representation given (Fig. 133) is from a boat built at Rannefjord, in the Nordlands Amt, about latitude 66° north.

They are called "keiper," and the same term "keiper" is found in old Icelandic Sagas.[1] The keiper consists of a piece of wood fastened to the gunwale by wooden pegs, bearing an oblique prolongation at one end, and furnished with a loop of wickerwork rope or leather

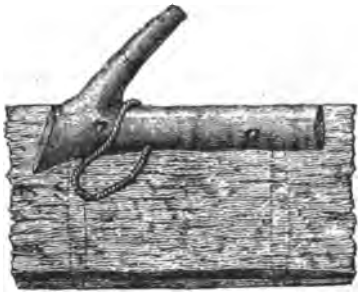


Fig. 133.
OARLOCK.
(Drawing from model in U. S. National Museum.)

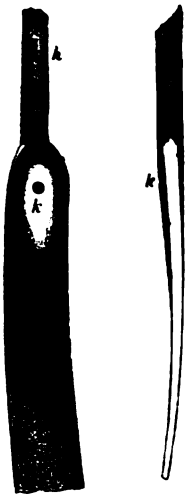


Fig. 134.
RUDDER OF TUNE SHIP.
(From G. Gade, "The ancient vessel found at Tune," 1872.)

through which the oar is passed, and which prevents its slipping out of the keiper while rowing.

Of thwarts no trace was found and their number can therefore only be estimated from the number of ribs.

The rudder (Fig. 134), which was found lying across the vessel, is of fir; its original position had been somewhere before the sternpost on the right side of the ship. It consisted of a plank in the shape of a broad oar 4 feet 7 inches long and 10½ inches wide, the lower portion of which, in the middle and 7 inches from the upper edge, was provided with a round hole through which it was fastened to the side of the ship by means of a rope, while its short, round upper neck was caught by a grummet. A small aperture in the opposite direction of the blade was made in the upper part of the neck for the tiller, which stood perpendicularly on the flat side of the blade. The rudder was mounted with iron,[2] to which one or more cramps were added down toward the heel of the rudder.

One of the points of especial interest is the peculiar manner in which the mast was secured. A large, square hewn oaken block (Fig. 135), extending in uniform length over five frame timbers and five beams, is

[1] Fornmanna Sögur: Snorre's Edda.

[2] Bergens Bylow, IX, p. 18.

laid amidships along the keel, notched to admit the frames, and above it rests another still larger oaken block (about 12½ feet long, a little over 2 feet wide, and 1¾ feet thick in the middle, but decreasing toward the ends, which are shaped like a fish-tail) grooved to admit the beams; and it is further fixed to the beams by knees or crooked timberheads. A little below the center rib a square hole, 3 feet 9 inches long and 11 inches wide is made in the upper block for the mast, which rests upon the surface of the lower block. A stump of the mast, about 2 feet long, was found standing in the hole, together with a stump supporting it, which is formed by a projecting thick knot of wood, leaving a space between the mast and the side of the slot in the mast-block. The intervening space was probably filled with plugs. A little in front of the mast there is a smaller hole, which probably accommodated some additional support for the mast.

Fig. 135.
MAST-BLOCK OF TUNE SHIP.
(From G. Gade, "The ancient vessel found at Tune," 1872.)

Just behind the mast the unburnt bones of a man and of a horse were found; there were also some colored glass beads, some pieces of carved wood, some cloth and the fragments of a saddle, and a portion of a snow skate. The inside of the vessel had been covered with a layer of moss before the mound was thrown up over it.

According to Mr. Gade, United States consul at Christiania,[1] "in the southern end of the mound at the height of the gunwale and still higher, traces of iron utensils were seen at many places, but they were so rusted away that there was hardly anything left but some stripes of rust in the earth. Nothing of it could be preserved and it was only in a few instances possible to make out what it had been. For instance, near the prow, at the eastern gunwale of the vessel, the handle of a sword of the form used in the Viking period was clearly distinguished; nearly opposite on the western side the point of a spear and the boss of a shield seem to have laid. Just where the prow must have been lay a long, heavy lump of iron rust, apparently a fragment of a rolled up coat of mail. On the western side of the gunwale about opposite the mast there was a heap of horse bones, but so decayed that only the teeth could be exhumed in any way whole. They were examined by a veterinary surgeon, who declared that there must have been the skeletons of at least two horses, viz, of an older and a younger animal. In that part of the mound was also found a little round bung of oak, such as might be used for a barrel, and also several oaken

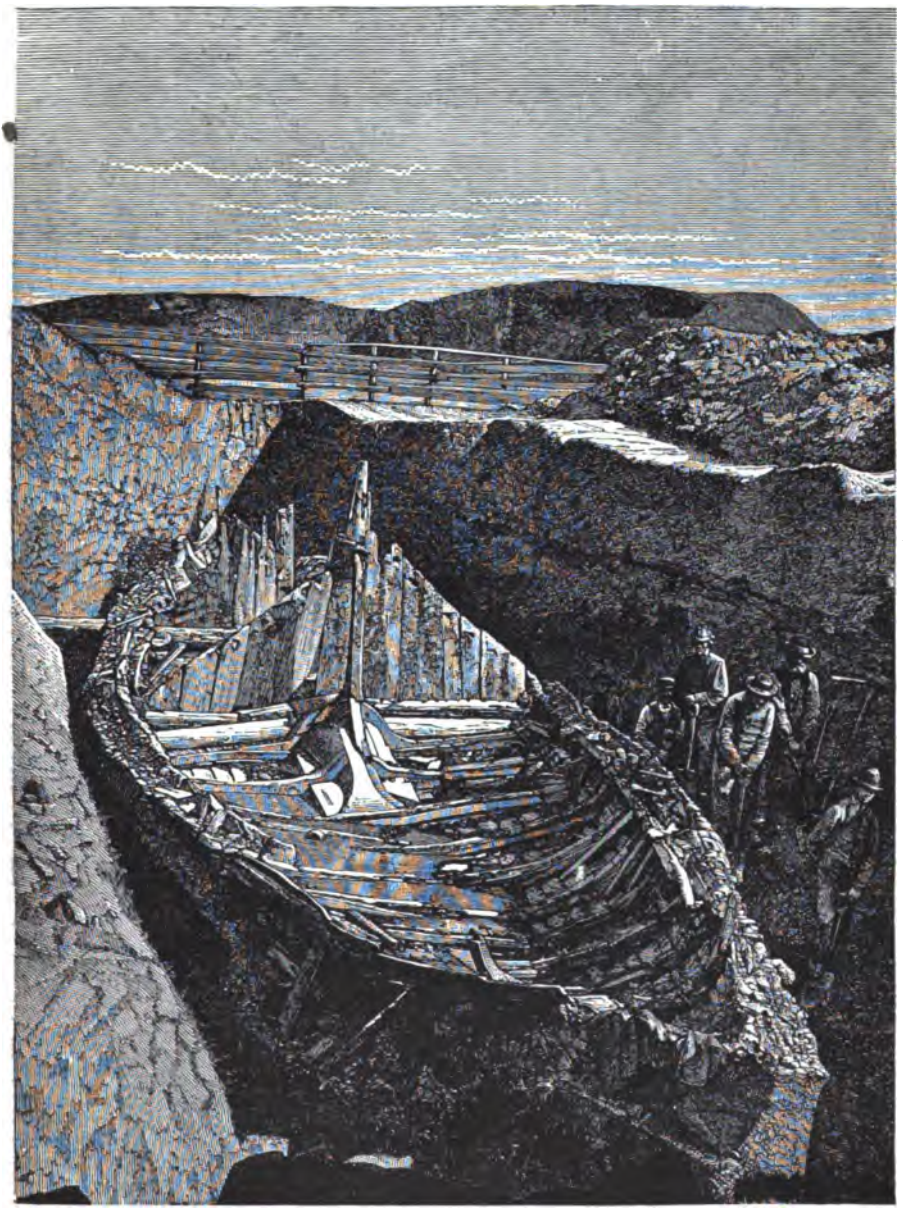
[1] The ancient vessel found in the Parish of Tune, Norway. Dedicated by the translator to Commander Stephen B. Luce, U. S. Navy, in remembrance of the United States corvette *Juniata's* visit to Norway in 1871. Kristiania, 1872.

sticks, 2 to 4 feet long, somewhat pointed at one end, scattered here and there in the vessel. At many places inside the vessel, but not equally distributed throughout it, juniper branches which had been pulled up with the root were lying in the clay and still so well preserved that the needles could be distinctly seen. Finally, under the vessel, on its eastern side were found an oaken spade or shovel and a handspike made of a young oak trunk, of which the bark was partially preserved. The articles found in and near the vessel completely established what might also have been supposed without their testimony, viz, that one had come on a ship-tomb from the younger iron age. The ship was carefully drawn out of the river not far distant; it was placed on the ground, the turf and earth having been previously removed. The situation chosen was such as was generally preferred for interments in heathen times, as the mound could be seen a great distance on all sides and the deceased could thus enjoy from his last resting place a fine view over the country where he had lived and toiled. After the space under the ship had been filled with earth the body of the deceased was placed in its aft part where, as its captain, he had sat when alive. The beads and the piece of cloth indicate that the body was buried with the clothes on. By its side a horse and a saddle, harness, and snow skate were laid. Thus he had ship, saddle, horse, and snow skates with him in the sepulchral tumulus. One involuntarily calls to mind the ancient account of Harold Hildebrand, who fell at the battle of Braavalla. Sigurd Ring ordered the body of the fallen king to be driven into the mound on the chariot he had used in the battle. The horse was killed, and Sigurd then had his own saddle buried in the mound, "that Harold might choose whether he would ride or drive to Valhalla." A little farther out in the mound, and apparently without regard to order, the weapons and several of the horses of the deceased were buried. With respect to several other articles discovered here, we can make the same remark as with the articles now and then found in other tumuli, that it is rather difficult to understand for what purpose they have been laid there.

We have, then, here considerable fragments of a vessel undoubtedly belonging to the Viking period. It can hardly be supposed that this is one of the ships in which the Norwegians of that period made their bold Viking expeditions in the Baltic, the North Sea, and the Atlantic. A vessel so small in size, and built so low and flat, could not be adapted to long voyages in the open sea; it can only have been used for coasting trade and shorter expeditions."

The Gokstad ship[1] (Plate LXXVIII).—In midst of a woodless plain extending northeasterly from the northern terminus of the Sandefjord is located the farm of Gokstad, and near it is a mound, for centuries known

[1] *Nicolaysen, N.:* Langskibet fra Gokstad ved Sandefjord, Kristiania, 1882. *Nicolaysen, N.:* The Viking ship, discovered at Gokstad in Norway, Christiania, 1882. The Antiquary, August, 1880; December, 1881, 1882, p. 87. Popular Science Monthly, May, 1881 (borrowing from La Nature, view of ship *in situ*). *Nordenskiöld:*



THE GOKSTAD SHIP: SHOWING LOCATION IN THE MOUND.
(Copied from R. Werner's "Das Seewesen der Germanischen Vorzeit," in Westermann's Illustrirte Monatshefte, October, 1882.)

as the "King's Mound" because, according to popular belief, a king had been buried there with all his treasures, and it was in the expectation of finding these treasures that early in January, 1880, the sons of the farmers of lower Gokstad began excavations of the mound. The Society for the Preservation of Norwegian Antiquities being informed of these proceedings, desired to take charge of the undertaking; after considerable negotiations with the proprietors they obtained the privilege of opening the mound, and on April 27, 1880, Mr. Nicolaysen, the president of the society, repaired to the spot to direct the work.

Fig. 136.
THE KING'S MOUND.
(From J. S. White, "The Viking Ship." Scribner's Magazine, vol. II, No. 5.)

The excavation was conducted with great care by opening a passageway right through the middle of the mound, and the second day already rewarded the diligent explorers by the discovery of a ship stern lying right in the track of the excavation. Upon further widening the track the entire ship was gradually laid bare (Fig. 136).

Voyage of the *Vega*, London, 1881, vol. I, p. 50 (illustration). Potter's American Monthly, 1882. *Werner, Admiral R.:* Das Seewesen der Germanischen Vorzeit (in Westermann's Illustrirte Monatshefte LIII, October, 1882. *Preble,* in United Service, May, 1883. Good Words, XXII, 759. *Boehmer, George H.:* Norsk Naval Architecture (in Proceedings U. S. National Museum, vol. IX, p. 455). Mémoirs de la Société Royale des Antiquaires du Nord, 1887, p. 280. *White, John S.:* The Viking ship (in Scribner's Magazine, vol. II, No. 5). *Preble,* in American Flag, p. 159. *Da Costa:* Pre-Columbian Discovery of America, p. xxxvii. *Fox's* Landfall of Columbus, p. 3. Popular Science Monthly, XIX, p. 80. *Turen, N. E.:* De Nordiske Langskibe. In Aarb. f. nord. Oldk. og Hist., 1886. Van Nostrand Eclectic Engineering Magazine, XXIII p. 320. Higginson's Larger History of the United States. *Worsaae, J. J. A.:* Prehistory of the North (English translation), London, 1886.

In placing the ship in position at the time of the interment supports had been provided by placing heavy, round logs at regular intervals horizontally against both sides of the vessel, and thus the ship could be fully excavated and left standing free without receiving additional support. (Fig. 137.)

The vessel rested upon blue clay, and to the upper limit of this all the woodwork had been well preserved; farther up, where the clay occurred intermixed with sand, the comparative lightness of the soil and its greater capacity for absorbing moisture had caused some of the wood to rot away, among it the stem and stern, with the adjoining planks, and

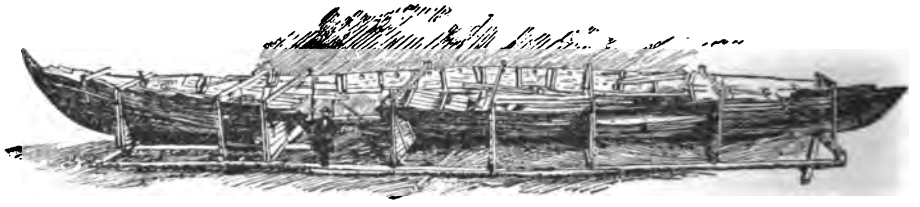


Fig. 137.
THE EXCAVATED SHIP.
(From R. Werner, "Das Seewesen der germanischen Vorzeit." Westermann's Illustrirte Monatshefte, vol. LIII, October, 1882.)

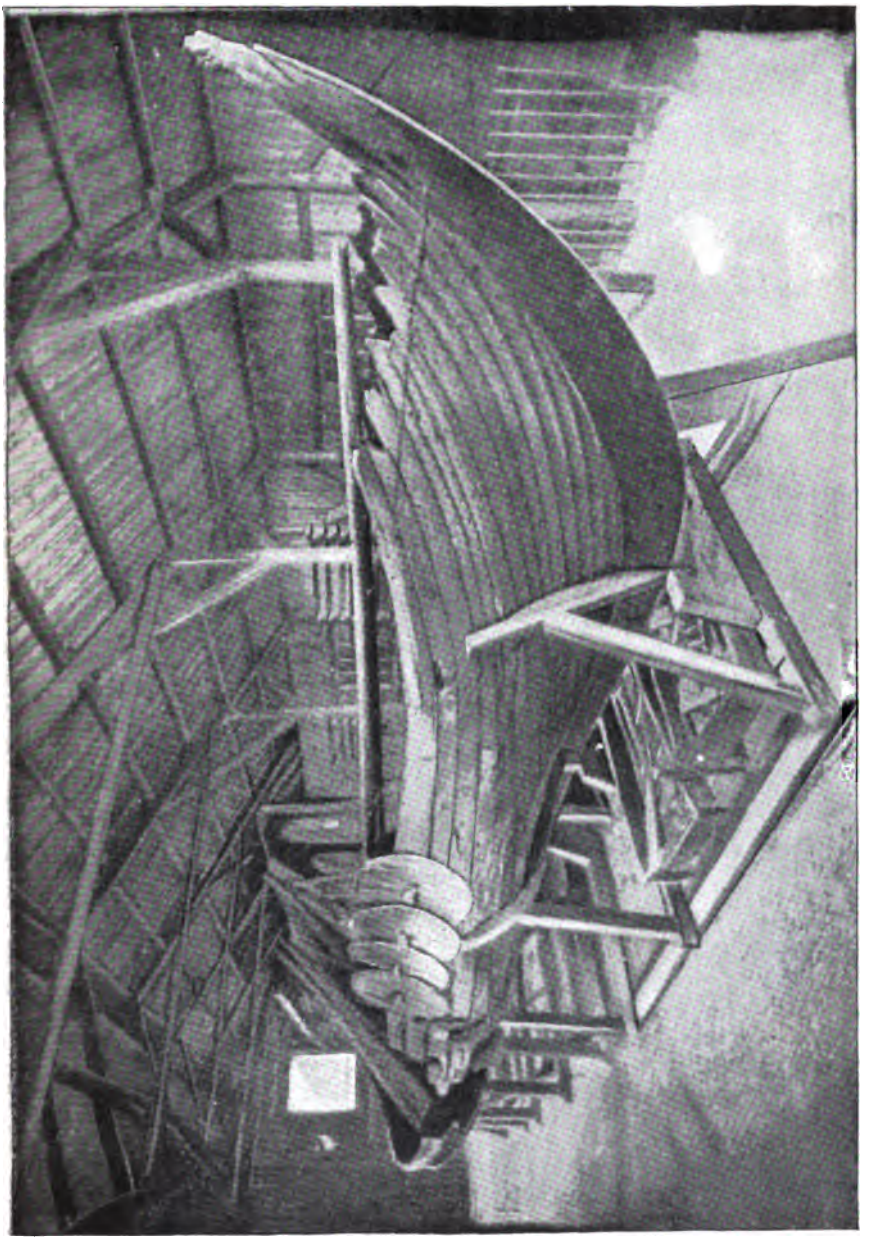
the gunwale (Plates LXXIX, LXXX), and the same fate the rest of the vessel would in all probability have shared, but for the imperviousness to moisture of the stratum of blue clay in which it was imbedded to a large degree, and for the pressure of the superincumbent stratum of earth which had bent the frames at almost right angles, thus removing them from contact with the lighter top soil.

Upon the completion of the successful excavation the vessel was removed to Christiania and now forms a great attraction among the exhibits in the Archæological Museum of the Royal Frederiks University. (Plate LXXXI.)

I had occasion to view this interesting relic on occasion of a visit to Norway, and I will now give an account of the same from my own observations and from the description given in Mr. Nicolaysen's splendid work, "Langskibet fra Gokstad ved Sandefjord," from which I have drawn information as well as borrowed illustrations. (Plate LXXXII.)

The dimensions of the ship are: Length of keel, 66 feet (20.10 meters), with a length over all of 79 feet 4 inches (23.80 meters) from stem to stern; breadth of beam, 16½ feet (5.10 meters), and perpendicular depth, 6 feet in the middle and 8½ feet at the extremities. It is of oak, unpainted, clinker-built, and composed of keel, stem and sternposts, frame timbers, beams, knees, and external planking, and in its construction bears a striking resemblance to the Tune ship, previously described.

The keel is 66 feet in length, ending in strongly prominent stems almost perpendicular at the top, joined to the keel by an intervening tongued and grooved connection that is further secured by a double row of spikes. The height of the keel is 12 inches, with an inner convex



THE GOKSTAD SHIP. STEM VIEW.
(From a photograph taken in Christiania, Norway.)

curvature of 5 inches in the middle; the ends are thus higher than the middle which, in connection with the prominent stems, has a tendency to increase the strength by placing the greatest draft where the ship is the broadest.

The ribs, seventeen in number, are not fastened to the keel, but lie free above it at equal distances of 3 feet. The beams rest on the top of the knees, the height of which corresponds to the tenth external plank and thus a solid basis is formed upon which the comparatively lighter superstructure rests. From the beams frame timbers extend to the height of the fourteenth strake, and further support is given to the structure by short timbers placed between every alternate frame and extending from the gunwale downward, and by similar supports mortised into the beams and with their lower ends cut so as to straddle the bottom timbers.

The beams being wider than the ribs upon which they are fastened and the frames of the superstructure, a ledge is formed upon which the ends of the bottom boards rest; these consist of thin fir boards laid edge to edge, each pair being bound together by a crossbar nailed to their underside with trenails; they are laid at right angles, but the outer layers conform to the curvature of the ship. All the boards were ornamented with concentric circles or other patterns.

The external covering consisted of sixteen planks tightened with cattle hair spun into three-stranded rope, which process would indicate that the caulking was done simultaneously with the laying of the planks. The planks vary in width from 7 to 9 inches, with a thickness of three-fourth inches; exceptions to this exist in the tenth strake, the thickness of which is 1½ inches, and the fourteenth, which is 1 inch thick; the two top planks are one-half inch thick only. Additional strength is thus given to those planks corresponding to the position of the beam and the ends of the short ribs.

The planking (Fig. 138) was secured to the frame in the same manner as observed in the Tune ship, namely, the ends of all the planks were cut tapering so as to closely fit the stem and sternposts, to which they were nailed with iron spikes; the bottom plank was fastened to the keel with iron rivets, and trenails were used to fasten the two top planks to the frames. All intervening planking (Fig. 139), although fastened to each other with rivets, were tied to the frames by means of withes made from roots and passing through clamps that had been cut out of the solid plank and corresponding holes in the ribs.

The ribs thus resting on the planks form, in connection with the thwarts, a solid body, stiffening the ship towards the sides; in the Gokstad ship the thwarts are the beams upon which the bottom (or deck) boards rest; nor could they be absent in a ship of this size, because clinker-built ships have their principal strength in the outer covering which is held in shape by the pressure against the well con-

structed and braced internal framework, furnishing a resistance which the ribs alone could not offer.

To strengthen the bulkheads vertical pieces (Fig. 140) of plank, in triangular shape, were inserted; in the sternboard three holes are shown which were probably intended for the passage of the rudder ropes.

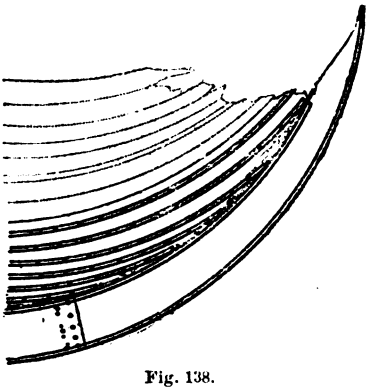


Fig. 138.

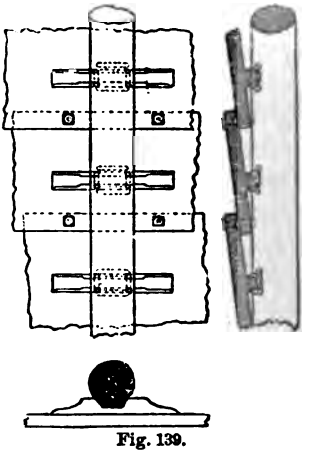


Fig. 139.

FASTENING OF PLANKS.

(From N. Nicholaysen, "Langskibet fra Gokstad," 1882.)

The mast rests in a socket cut in two large oaken blocks of the shape of a fish-tail, laid amidships along the keel, the lower one extending over four timbers and being notched to admit them; the upper block extending over six frames, admitting the beams and being fitted to them by knees or crooked timber heads; the mast is also steadied by a loose slab which fits the opening like a lid.

Between the seventh and eighth forward frame a large wooden block is placed, probably intended to support a windlass.

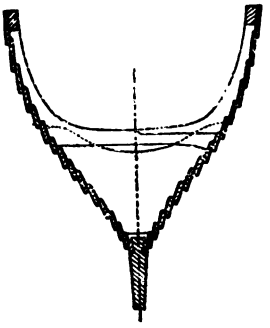
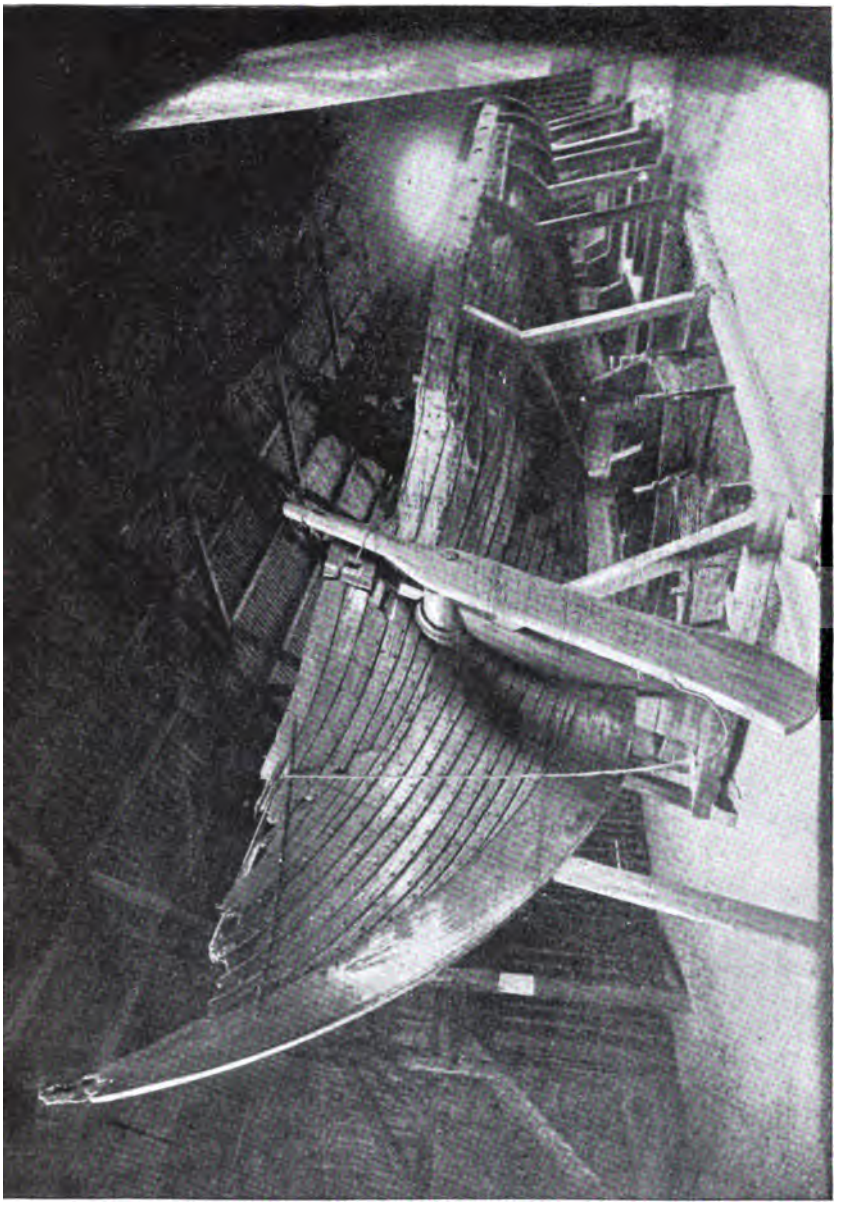


Fig. 140.

CROSSPIECES TO STRENGTHEN BULWARK.

(From N. Nicholaysen, "Langskibet fra Gokstad," 1882.)

There are three stanchions, of which one is fastened to the mast block and the other two rest in a four-cornered step after having passed through an aperture in fish-tailed shaped blocks placed between



THE GOKSTAD SHIP. STERN VIEW.
(From a photograph taken in Christiania, Norway.)

the third and fourth frames fore and aft; they may have been intended as supports for the spars.

In addition to mast and sail the ship carried thirty-two oars, sixteen on each side, which were plied through circular portholes (Fig. 141) cut in the third strake from the top and placed midway between each pair of knees. The size of the oars, some of which were found to have carved ornamentations, diminished from amidship toward each end, and

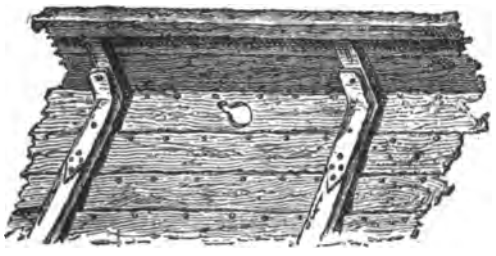


Fig. 141.
OAR POSTS OF GOKSTAD SHIP.
(From R. Werner, "Das Seewesen der germanischen Vorzeit." Westermann's Illustrirte Monatshefte, October, 1882.)

Fig. 142.
RUDDER OF GOKSTAD SHIP.
(From N. Nicholaysen, "Langskibet fra Gokstad.")

corresponding decrease is noticeable in the portholes. Back of each hole and a little above its horizontal diameter a slit is cut, through which the oars were shipped, and all being in the same direction all the blades would touch the water at a uniform angle.

Influx of water is prevented by a very ingenious application in the form of a shutter having two projections, one of which was fastened to the inside of the ship with a spike, around which they would move and open with a forward movement of the oar; when closed the circular portion would cover the port, while the lower projection, resting against a pin, would perform a like service to the slit.

The rudder (Fig. 142) consisted of a plank in the shape of a broad oar, the lower portion of which, in the middle, was provided with a

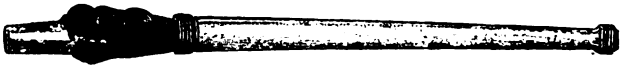


Fig. 143.
TILLER OF GOKSTAD SHIP.
(From N. Nicholaysen, "Langskibet fra Gokstad.")

round hole through which it was held to the side of the vessel by means of a rope. Its short neck was caught by a grummet; the tiller (Fig. 143) was fitted into a square aperture in the opposite direction of the blade.

The rudder was mounted with iron and provided with a cramp toward the heel.

To strengthen the upper part of the ship's side a wooden pillow, or block (Fig. 144, 145), has been laid outward and through this the grummet passed. Further down a block of conical form is nailed to the ship's

side bored through, which serves partly as a fender to keep the rudder from the planking and also afforded passage for the rudder rope.

The question of the position of rowers' benches is rather puzzling, as neither have the benches been found nor do the knees or beams give an indication of the method of the fixing of seats for the rowers. It is true the ancient writings do not state that the rowing was performed

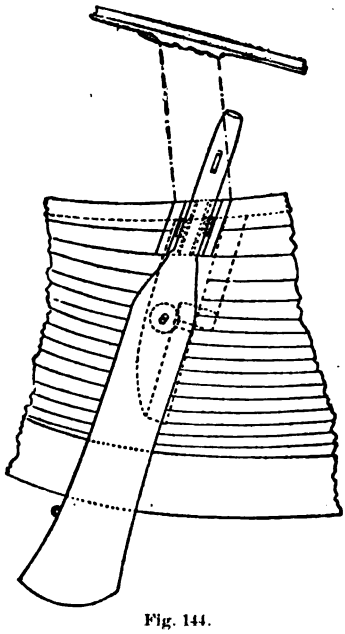


Fig. 144.

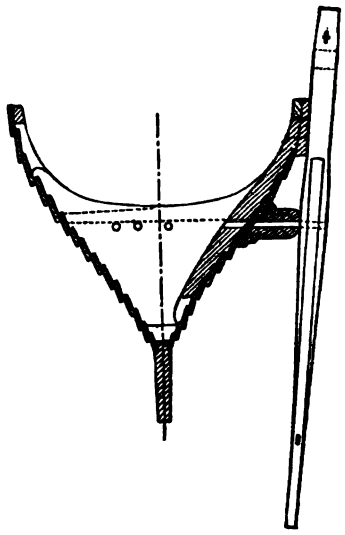


Fig. 145.

FASTENING OF RUDDER TO SHIP'S SIDE.
(From N. Nicholaysen, "Langskibet fra Gokstad.")

in a sitting position, yet the word *sess* (seat), as applied to the number of oars by which the vessel was classified, gives a significant indication to that effect.

Of the gunwale the greater part was decayed, yet sufficient remained to indicate between the short timbers a continuous skirting with rectangular openings which, it is supposed, were used for the tying of the cords by which the ship's tent was stretched, under which most of the hands could find shelter against the weather.

In the ship discovered at Gokstad were found the four supports of such a tent, together with fragments of the cloth and the cords. The supports are heavy boards, 11 feet 8 inches in length, finely carved at the upper extremity to represent the head of some animal, and in part painted (Fig. 146). They had been placed obliquely, so as to form two crutches, one at each end of the tent, with the carved heads projecting, and connected together by the pole, or rather transverse bar of the tent, which thus formed a gable-ended roof, extending fore and aft from the pole to the rail of the ship. The tent cloth is made of a rather fine woolen texture, white, with broad red stripes sewed on; the cords

THE GOKSTAD SHIP.
SHOWING ITS POSITION IN THE GROUNDS OF THE ROYAL UNIVERSITY AT CHRISTIANIA, NORWAY.
(From a photograph taken at Christiania, Norway.)

for fastening it are hemp. The pieces of ship's rope, of which a good many were found, are all made of bast.

Along the gunwale were hung shields—originally thirty-two, of which some along the port side had disappeared at the time of earlier attempts to open the mound. Of the remaining, some had been pressed and bent out of shape. They measured 94 centimeters in diameter and consisted of thin boards fastened together by means of the boss and by the handle. They apparently had been provided with a metallic rim which, however, had disappeared. The shields were painted, alternately yellow and black, of the same tints as the colors used upon the carved heads and upon the tiller.

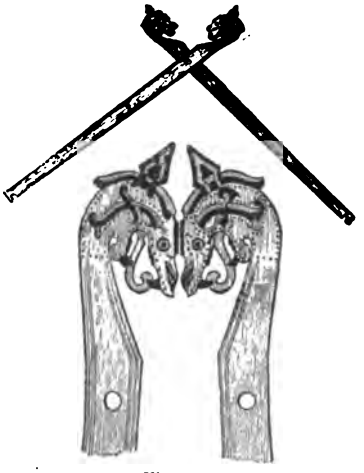


Fig. 146.
TENT SUPPORTS OF GOKSTAD SHIP.
(From N. Nicolaysen, "Langskibet fra Gokstad.")

A large grave chamber of wood was built in the middle of the ship from the mast toward the stern. It had the form of a gable roof, the sides consisting of round logs and the gable ends of planks placed on end. In this chamber the remains of the dead were deposited, unburnt, and no doubt on a bed, fragments of a bedstead having been found in the chamber.

Unfortunately this ship tomb had been visited by grave robbers, in all probability during the pagan era. They had dug into the mound on the port side and gained access through a large opening which they cut in the ship's side and the wall of the grave chamber. This accounts for the fact that the bones of the body had nearly all disappeared; that in the chamber there were but few articles of antiquarian value compared with what it might reasonably have been expected to contain; and, in particular, that no implement of war was found. The miscellaneous character of that still remaining, however, gives reason to infer that a manifold collection of weapons, ornaments, and utensils had originally been deposited. Thus, several iron fishhooks and a

burned checkerman of horn were found in the grave chamber. The most remarkable of the remaining articles are two ornamental mountings for belts or straps, one of gilded bronze, beautifully executed in a peculiar and characteristic style, and the other of lead. Of wearing apparel belonging to the deceased a few small fragments were found, some of gold brocade.

A great number of animals must have been sacrificed on the occasion of the burial. The bones of at least twelve horses and six dogs, as also the bones and feathers of a peafowl, were collected from different parts of the mound.

Of the numerous articles of antiquarian value found in or about the ship, more or less perfectly preserved, the following deserve special mention:

(*a*) Fragments of three oak boats that had been broken up previous to being deposited in the vessel, and no part of which, with the exception of the keel, can now be put together. Like the ship they were clinker-built, but instead of holes for the oars they have rowlocks of a peculiar form, fastened to the gunwale. Two of the boats have certainly carried a mast. Their size has been comparatively considerable, the keel of the largest boat being 22 feet 4 inches in length and that of the smallest 14 feet. Several of the oars belonging to the boats are preserved. They exactly resemble those used for rowing the ship.

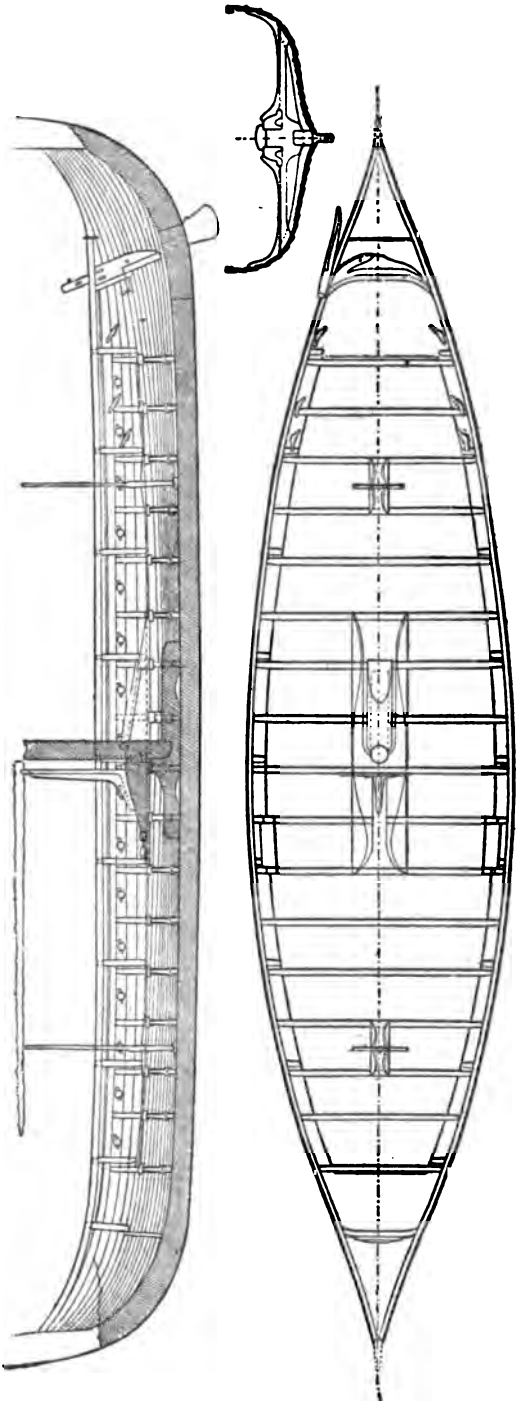
(*b*) The stock of an anchor; being of iron it had almost corroded away.

(*c*) A landing stage, or gangway, 25 feet long, but only 20 inches wide. It has the upper surface transversely ribbed to give a secure footing.

(*d*) Fragments of sleeping berths, at least four. These berths, a couple of which have been restored, are of much the same shape as the bedsteads now in use among the Norwegian peasantry. They are very low and put together so as to be readily taken to pieces and stowed away.

(*e*) Parts of a wooden chair, finely carved, that would appear to have been the high seat of the chieftain or commander of the vessel. The side pieces—in an excellent state of preservation—are modeled at the top to represent the heads of animals in precisely the same style as the upper ends of the tent supports.

(*f*) A great variety of kitchen utensils, among which were a very large and massive copper kettle, together with the iron chain, gracefully wrought, for suspending it over the fire; bits of a smaller kettle, of iron, and of the chain belonging to it; numerous tubs and buckets of different sizes; wooden plates; several small, finely carved wooden drinking cups, with handles; and many other articles. No trace of a fire place can be discovered in the ship, nor would it, indeed, have been easy to provide one in an open vessel of this kind. Hence the cooking utensils were only of service while coasting, when a harbor could



THE GOKSTAD SHIP. CENTRAL LONGITUDINAL AND TRANSVERSE SECTIONS.
(From Nicolaysen's "Langskibet fra Gokstad.")

at any time almost be gained, and in those days a ship kept near the shore whenever possible.[1]

The various articles of antiquarian value found in the mound, together with the style of ornamentation in the carving of different parts of the ship, sufficiently attest the correctness of the inference concerning her antiquity which the mere fact of entombing a vessel in itself entitles us to draw, namely, that she belongs to the period extending from the year 700 to 1050 after Christ. (Plate LXXXIII.)

The following interesting résumé is obtained from a study of the Gokstad ship:[2]

Length between sterns		79′ 4″
Length of keel		66′ 0″
Width above gunwale, amidships		16′ 2″
Perpendicular depth from gunwale to bottom		5′ 7″
Draft at middle of keel		3′ 7″
Draft at ends of keel		3′ 2″
Gunwale above water, amidships		2′ 11″
Gunwale above water, at sterns		6′ 6″
Length of uppermost water line		67′ 0″
Width of uppermost water line		14′ 10″
Area of uppermost water line	square feet..	630
Area of middle rib	square feet..	24
Displacement	cubic feet..	959
Displacement center before the middle	tons..	30.2
Number of oars on each side		16
Distance between oars		3′ 0″
Middle oar above surface of water		1′ 6″
Length of middle oar		18′ 6″
Entire crew		70
Weight of crew with accouterments	tons..	10
Weight of ship and equipment	tons..	20.2

Boats of the Gokstad Ship.[3]—According to saga account every large ship had its boats, sometimes two or more,[4] which were taken on board when the ship was made ready for sea.[5] They ranged from two oars (*dri*) to twelve oars (*tolfæringer*), which were worked through rowlocks (*keiper*) fastened to the gunwale and loops fastened thereto; two oars were generally worked by one man.[6] The boats were clinker-built, fitted with mast and sail, and had a movable floor between the frames.

[1] *Nicolaysen*, Langskibet, etc. p. 23, says: "The cooking could only be done on land, which is presupposed in the municipal law of Bergen (1276), where it is enacted that the mate shall, whensoever the ship lies at anchor in harbor, cause the crew to be put on shore and backward once a day, but the cook thrice, once to take in water and twice to prepare food."

[2] *Tuxen, N. E.:* De nordiske Langskibet.

[3] *Nicolaysen, N.:* Langskibet fra Gokstad.

[4] Sigurd Jorsalafari Saga, c. 6; Eyrbyggja, c. 29.

[5] Egils Saga, c. 60; Eyrbyggja, c. 29; Gretti's Saga, c. 17; Flateyarbok, III; Biskups Saga, I, 492.

[6] Flateyarb., I, 396; Heimskringla, p. 784.

In the Gokstad ship fragments were found of three oaken boats with their rudders, two mast-steps, one thwart, six triangular pieces of board, a backboard, bottom boards, and two clamps with plugs. Although too much broken up to permit of restoration, the fragments give an idea of form and point to similarities with corresponding parts of the mother ship.

The boats are built of oak, unpainted, very sharp at the ends, and consist of keel, framing, and planking. The keels are 7.7, 5.4, and 4.1 meters in length, respectively, and are, at each end, fixed immediately to the stems—in the Gokstad ship an intervening piece forms the connection; the boards are connected to each other by iron rivets, and are attached to the frames by either cord or trenails. The stems lie lower than those of the ship and spring up to a point.

The boats have no beams, but simply detached thwarts; nor have they a mast partner, but are provided with a mast step similar to the block, serving as support to the stanchions in the Gokstad ship; the mast appears to have passed through a thwart, as indicated by one found with a circular hole cut through it. The rudders are of the type of the Gokstad ship, but are without the iron ring at the top, and only one of them had an iron cramp at its head. The bottom boards were fitted between the frames and were put together in the customary manner with connecting crosspieces underneath; triangular pieces were fitted in stem and stern. The oars resemble those of the Gokstad ship; they were plied from rowlocks nailed to the top of the gunwale. (Fig. 147.)

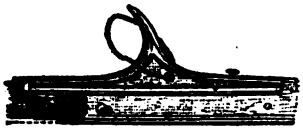


Fig. 147.

ROWLOCK ON BOAT FOUND IN GOKSTAD SHIP.

(From N. Nicolaysen, Langskibet fra Gokstad.)

The boats are, in every respect, specimens of skillful and expert workmanship, and, being the only specimens of this class of craft known to exist from that period, they are of possibly still greater antiquarian value than the ship itself to which they belonged.

The Gloppen Boat.[1]—During the excavation of a mound near the Gloppen Fjord in Bergen district, undertaken in 1890, under the auspices of the Bergen Museum, a large number of rivets were found extending at regular distances in rows which were followed up in a northwest and southeast direction, and, although of wood but few remains were found completely saturated with iron rust so as to preclude possibility of identification, the nails suggested the shape of a boat which had been placed in the mound parallel to the shores of the fiord.

The boat there buried appears to have had a length of 28 feet, by 40 inches in width; the lowest layer of nails was placed 4 feet below the surface of the mound. It consisted of five boards on each side exclusive of the top rail; it had six thwarts—distinguishable by large rivets found in their places—placed at regular distances of 3½ feet, the

[1] *Gustafson Gabriel:* En baadgraav fra vikingetiden. In Bergens Museums Aarberetning f. 1890, No. VIII.

THE GOKSTAD SHIP.
(Photograph of model in U. S. National Museum.)

first one being 5 feet from the bow. The seat for the helmsman was 7 feet from the stern.

The outlines as well as the construction of the craft exhibits a remarkable resemblance to the modern boats of Northfiord; both are represented in the accompanying figure (148), in which the contours of the modern craft are shown in a connected line, while those of the ancient boat are

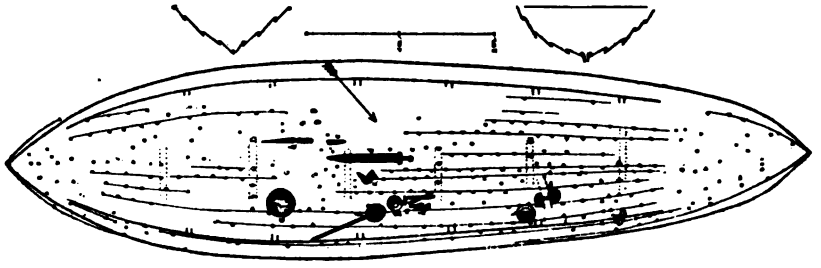


Fig. 148.
THE GLOPPEN BOAT.
(Reproduced from Gabriel Gustafson, "En Baadgrav fra Vikingetiden.")

indicated by the nails which were joined by lines, and an interruption in the rows indicate the place at which the nails were disturbed. The similarity between the two extending even to the intervals between the nails, a general description of a Northland five-seater may be of interest. As an illustration, the Söndmöre boat[1] (Fig. 149.) used in the fisheries along the coast of Norway from Egersund, in Lister, round the North Cape to the frontier of Russia, a distance of about 1,200 geographical miles, has been chosen. These boats are called "Nordslandsbaade" (Northlands boats);[2] they are described as long, narrow, and low, light and elegant, fit both for sailing and rowing,[3] and, on account of their peculiar construction, are believed to be more elastic, safer, and swifter in a sea way. These boats are clinker-built and have four strakes, except at the bow where there are six strakes; lower bow plank put on diagonally with end chamfered to fit on other planks, to which they are nailed; no gunwales; strengthening pieces[4] along the inside next to upper strake; heavy timbers; boat entirely open; six thwarts; five rowlocks; deep keel, curving up like a sled runner at each end to form stem and stern posts which are high; bottom slightly concave with much dead rise, being nearly straight to top of upper strake;[5] ends sharp and very flaring; small rudder; peculiar jointed tiller; single mast, stepped amidships with strong rake; four shrouds aside with toggles on lower ends that pass through beckets at the boat's side; single lugsail with narrow head tacks down to stem; the oars are

[1] *Boehmer, Geo. H.:* Norsk Naval Architecture. In Proceedings U. S. National Museum, 1886, p. 443.

[2] *Dirike and E. Sundt:* In "Folkevennen" of 1863 and 1865.

[3] Model in U. S. National Museum.

[4] Folkevennen XII, p. 349.

[5] *Eli Sundt* "Nordlandsbaaden," p. 25.

plied from rowlocks, called "keips," which name occurs in the old sagas (Fig. 74), consisting of pieces of wood fastened to the gunwale by wooden pegs (in the absence of a gunwale they are fastened to the top plank by two iron nails), having an oblique prolongation at one end and furnished with a loop of wickerwork rope or leather, through which the oar is passed and which prevents its slipping out of the keip while rowing.

In the Gloppen boat a man had been buried, but his remains could no longer be found, nor are traces of burning shown in the mound nor

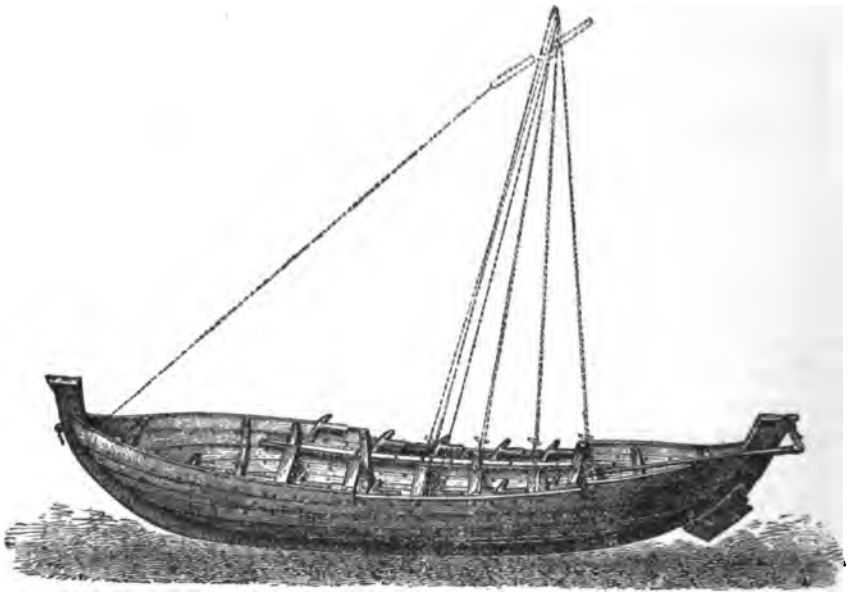


Fig. 149.

SÖNDMÖRE BOAT.

(Drawing made from model in U. S. National Museum.)

upon the articles found within the ship, consisting of a double-edged sword, an ax, a spear of elegant form and nine bronze nails, two arrows, knife with worn blade, a large file, frying pan, saucer, three hundred rivets, mostly from 2½ to 3½ inches long, some objects of iron whose application could not be determined. From the location of these articles, and most especially of the sword, which was placed with its point towards the prow of the boat, it is surmised that the body had been placed there with the feet in the same direction and therefore corresponding to the positions found in other mounds.

The Botley War-ship.—On the banks of the small river, the Hamble, which falls into Southampton water, about 2½ miles from Botley, and about 2 miles inland above Burslean bridge, which carries the main road from Southampton to Portsmouth over the river, at a place which has been inaccessible for ships for centuries, an ancient vessel of large size was discovered in 1875.

For many years tradition spoke of an ancient vessel having been wrecked on the muddy banks of the Hamble, and a few fragments of blackened wood, covered with seaweed, were pointed to from time to time when they were visible, at very low water in a double and parallel row.

The attention of Mr. E. P. Loftus Brock, the honorary secretary of the British Archæological Association, having been directed to the subject, he collected many of the facts from the gentlemen who had been most instrumental in bringing it to the public notice, and from his report I quote:[1]

"I am informed by Mr. Herbert Guillaum, of Botley, that about fifty years ago a rough carving was discovered accidentally, by an inhabitant of this district, to form a part of a wreck, and it was removed with the fore part of the ship. It is spoken of as having been the figure-head, and having the form of an animal resembling a lion. It was removed, and its whereabouts can not now be traced.

"The course of a small rivulet having within very recent times been turned into the river, the thick bed of mud covering the wreck has been by degrees removed and the broken timbers were much more distinctly visible, and much local curiosity to learn more of the form of the vessel was evinced. Francis Crawshay, esq., having become the owner of some property in the locality at Burkedan, undertook the work of exploration with considerable spirit and appears to have spared neither time nor money in carrying it out.

"The vessel proved to be of very considerable dimensions, being about 130 feet in length and extending from close to the water's edge into the stream. On the mud being dug out to the depth of about 10 feet, the upright timbers, which were 14 inches by 10 inches, were found to be planked over with three layers of planks, varying from 4 to 6 inches in thickness. These had been bent to the shape of the ship and their edges were beveled. The joints had been caulked with moss and fern leaves, and these were found to be so perfect that the exact outlines of the leaves could be made out. The timbers, which are probably oak, were nearly black or chocolate color by age, and of great hardness, but the grain of the wood was very distinctive when sawed through. Traces of fire were visible upon some of the timbers. Mr. Crawshay's excavations were continued down to the keel of the vessel, and the length, 130 feet, was taken along it.[2] Old saw-marks were distinctly traced on many of the timbers, and the instruments used must have been of much greater thickness than those now in use, in one place the saw-cuts being ¼ of an inch. The timbers were put together with oak trenails, 1½ inch in thickness and about 20 inches

[1] Read before the British Archæological Association, thirty-second annual meeting, at Evesham, August 16 to 21, 1875.

[2] Its length is much greater than that of any other ancient vessel yet met with. The celebrated ship found in the Rother was about 60 feet long.

apart, securing the three thicknesses of boarding to the uprights. The edges of the boarding were nailed together by iron square nails with some round heads, now very much decayed. The wreck is said to be that of a Danish ship. Its large dimensions warrant this supposition, but it may be unwise, as has been done, to endeavor to fix its being abandoned on the spot where now found after so many centuries, to the Danish invasion of Wessex, 871, or to the attacks upon Southampton, a century later."

Unfortunately the researches terminated rather abruptly, the board of trade seizing the wreck and placing it in the coast-guard house at the mouth of the Hamble.

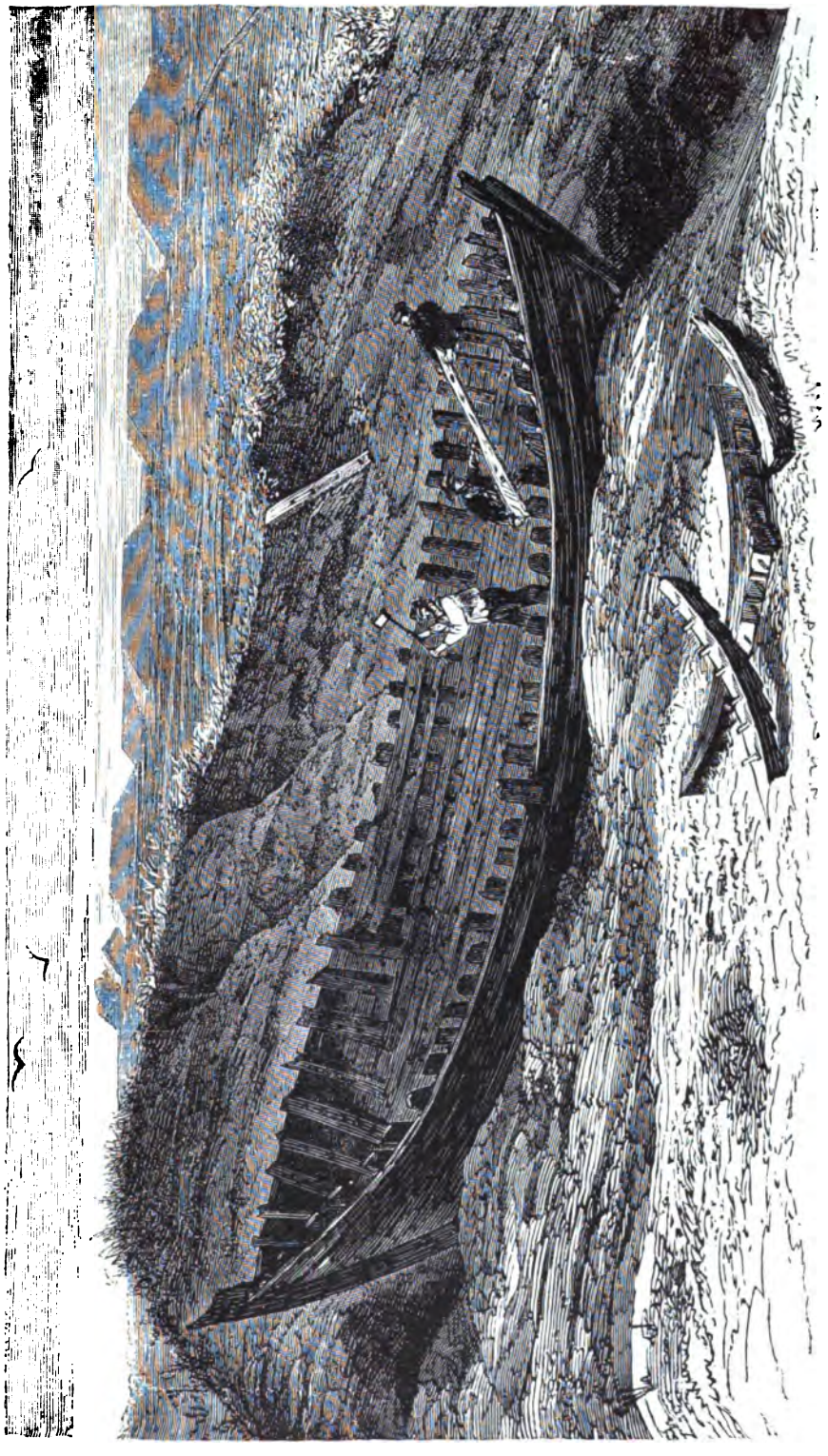
The Brösen Boat[1] (Plate LXXXIV).—On occasion of the enlargement of the port of Danzig an ancient but well-preserved wreck was discovered near the village of Brösen, about 1,000 feet from the present shore line, and buried in sea sand to a depth of 15 feet. These two facts give evidence of the antiquity of the vessel. The oldest chart of the mouth of the Vistula, published in 1651, designated the place upon which this vessel was found as solid land, while the Westerplatter, one of the favorite beaches of Danzig, now covered with a dense forest, was then a mere shoal. The rapid descent of the Vistula, together with the running ice which plows the shores, may be considered as the cause of the changes that have taken place in the configuration of the coast; yet, if the Westerplatter required almost 250 years for its development and the growth of forest, the place of the find, being located at three times the distance from the beach, must, reasonably, have required three times that space of time for the change from water to land, and the depth of the sand would indicate even a greater antiquity.

The utensils, too, found with the ship would indicate a higher antiquity. They consist of a bronze compass-[?]lamp of 4½ inches diameter, 2½ inches high, and in the form of a flattened bulb, with cylindrical projection downward; a furrow on either side would point toward a handle within which it was swung. The lamp shows on top an aperture of 1⅞ inches, closed by a lid; three burners within a triangle were placed upon the arc.

Within the ship were found furthermore an iron ball of 1½ inches diameter, a drinking-glass of light-green color and supplied with a leaf-like ornamentation, two incomplete human skeletons of large proportions, the bones of which were partly broken and had turned black.

The ship measured 57 feet in length by 16 feet in width and 5 feet in height. Being open on top, and the upper ends of the ribs being broken off, it may be surmised that its depth was greater than 5 feet and that it may have had a deck, which possibly had been raised by the waves and drifted away.

[1] Ausgrabung eines Wrackes am Ufer des Baltischen Meeres, bei Danzig. Von M. Bischoff. In Leipziger Illustrirte Zeitung. No. 1542, 18 Januar, 1873. (Translation.)



THE BRÖSEN BOAT.
(Copied from "Illustrirte Zeitung," Leipzig, 1874.)

It is built of oak of an ink-blue color and of such a degree of hardness that it required great exertions to break it up; it is klinkerbuilt, the planks being 1½ inches thick; the ribs are notched and the planks fastened to them with wooden nails of 1 inch thickness and with iron nails of 4 inches length. The iron nails had corroded away, only leaving a black powder and the holes connected by them. The wooden nails are in a good state of preservation; they are of oak, juniper, and birch trees of one year's growth, as indicated by the wood. The present wooden nails, made of pine, only last ten years. The caulking is done by means of cords twisted of the black hair of elk, bear, or other wild animal, saturated with tar that scented of amber.

It is pointed at both ends and its greatest width is one-third of the length. The stem-post was moderately rounded off; the stern-post straight. No trace was found of a fixed rudder. The bottom is flat with exception of the hollow groove towards the keel. The execution is exceedingly rough, and smooth cuts of the saw nor traces of the plane are nowhere noticeable; even the planks appear to have been split instead of sawed.

Levy of ships.—For the service of the king the country was divided into ship levy districts (*skipreida*), each of which had to build, equip, and man a certain number of ships of specified order, carrying not less than twenty nor more than thirty pairs of oars. Upon the declaration of war the *War Arrow* was sent to summon the warriors to their posts. The sending of the war arrow had to be performed quickly and the ancient law provides[1] that "when a man carries war news he shall raise an iron arrow at the end of the land. The arrow shall go with the *lendir* man and be carried on a manned ship both by night and by day along the high road (the sea). Those who drop the arrow are to be outlawed. A wooden arrow shall go into the fjords from the high road and be carried with witness, and each man shall carry it on to the other. The one who drops it must pay a fine of 3 marks. When it comes where a woman lives alone she must procure ships, and food, and men, if she can. But if she can not, the arrow shall be carried onwards. Every man in whose house the arrow comes is summoned within five days on board a ship. If anyone remains quiet he is outlawed, for both thegn and thrall shall go."

Levies are mentioned in many sagas[2] and the ships thus brought together, strengthened by the numbers of vessels belonging to individuals,[3] formed large fleets of whose visits to foreign shores the Saxon, Frankish, and English chronicles recount many instances.

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[1] Earlier Gulathing law, c. 312 and 301.

[2] Olaf Trygvason Saga, c. 15, 17, 38, 40, 107; Hakon the Good Saga, c. 3, 23; Harald Hardrade Saga, c. 31, 33, 34, 40, 46, 50, 53, 54, 83; Hakon Grayskie Saga, c. 12; Olaf Kyrre Saga, c. 108; Magnus Barefoot Saga, c. 5, 8, 16; Sigurd the Crusaders Saga, c. 16, 27.

[3] In the battle of Frædarberg King Hakon the Good had 9 ships and Eric's sons had 20 (Hakon the Good Saga, c. 24). Gold Harald sailed with 9 ships; Earl Hakon (Sigurd's son) had 12 large ships (Olaf Trygvason Saga, c. 12). King Harald Gormon

The monk of St. Gall tells us how early Charlemagne had recognized the bad intentions of the Northmen,[1] and, foreseeing evil, he ordered in the spring of 800 A. D., ships to be built upon all rivers coming from France and Germany and ships everywhere, and at all places where landings of the pirates might be expected he ordered guards to be stationed.[2] The most vulnerable point was the coast of his slavic tributary people and allies. Thus, in 808 A. D., Gotrik, a Danish king, surprised the Abodrites (the inhabitants of the present Mecklenburg), laid the people under contributions, and exacted a money tribute even of the Frisians.[3] In 810 A. D., the Northmen assailed the coast of Frisia with two hundred vessels.[4]

In 802 A. D., a capitulet ordered all free men living along the shore to hasten to ship upon the sounding of alarm.[5] In 810 A. D., Charles mustered at Boulogne the fleet which he had created, and reconstructed the old Roman pharos.[6]

In 828 A. D., Harold caused the Saxon counts upon the Eider a new loss.[7] In 845, simultaneous with an attack upon Paris, Eurik, King of the Northmen, with six hundred ships, entered the river Elbe and ransacked Hamburg.[8] In 852, Godfrey, son of Harold the Dane, with two hundred and fifty-two ships, harassed the territory bordering the mouth of river Scheldt.[9] In 860, during the reign of Ethelred, a large fleet of Northmen came to land, and the crews stormed Winchester.[10] In 857, the Northmen invaded the city of Paris and set fire to it. They are said to have had a fleet of seven hundred large ships, besides smaller ones, and landed 40,000 men.[11] In 861, the Danes, under their king, Welland, set out with a fleet of more than two hundred ships.[12] In 865, the Northmen entered the river Seine with five hundred ships.[13]

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of Denmark, sailed with 60 ships (Olaf Trygvason Saga, c. 15). At the beginning of the battle with the Jomsburg vikings, Earls Harald and Eric had 150 ships; of the Jomsburg vikings Earl Sigvald had 20 ships and Bue and his brother Sigurd had 20; Vagn Aakerson had 20 ships (Olaf Trygvason Saga, c. 43). King Trygvason sailed against the Danish king with 71 ships (Olaf Trygvason Saga, c. 110). The Jomsvikings attended the *arvel* of King Svein Tjuguskegg at Zealand with 170 ships (Jomsvikings Saga, c. 37). In 840 Harold Blatönn went to Norway with a fleet of 700 ships (Olaf Trygvason Saga, c. 24).

[1] Monachi Sangalli Geste Caroli II, c. 14, 757; Mon. G. H. T. ii.

[2] Einhard, Vita Caroli M. ed. Pertz, c. 17; Einh. Annal. ad A. 800, 157; T. I. Mon. G. H.

[3] Saxo Gram. Hist. Dan. VIII, 167 (ed. Stephanii).

[4] Einhard Annal a. h. a.; M. G. H. T. I., 197; Saxo Gram. i, c.

[5] Capitularia Reg. Franc. ed. Baluz, Paris, 1780, i, 377.

[6] Einh. Annal. a. h. a., 199.

[7] Einhard Annal. A., 828.

[8] Annal. Trescens. ad A. 845; Vita Anskarii, 700.

[9] Eginh. Annal. a., 852.

[10] English Chronicles.

[11] Eginh. Ann. Barthold, (Geschichte d. Deutschen Seemacht), places this event in 885–6.

[12] Ibid., a. 861.

[13] Ibid., a. 865.

In 880, the Danes captured the Duke of Saxony, together with eleven counts, two bishops, many captains and their men.[1] In 893, a Danish fleet of two hundred and fifty ships landed at the mouth of the Lymne.[2] In 894, the Danes among the Northumbrians and East Anglians gathered one hundred ships and went south to besiege Exeter.[3] In 927, King Aulaf entered the Humber with a fleet of six hundred and fifteen sails.[4] In 993, Olave came to Staines with ninety-three ships.[5] In 994, Olave and Sweyn (Olaf, of Norway, and Svein, of Denmark) came to London with ninety-four ships.[6] In 986, Erik the Victorious, of Sweden, appeared upon the North Sea with an enormous fleet, devastated Flanders, entered the river Elbe, and stormed Stade.[7] In 1009, Thurkills came to England with a large fleet, and after him came another innumerable fleet of the Danes.[8] In 1012, Svein, with an enormous fleet, entered the port of Sandwich and forced acknowledgment by the Anglo-Saxons.[9] In 1016, Knut entered the Thames with one thousand two hundred[10] (1,000, 340, or 205 vessels,[11] each carrying eighty men.

The largest fleet ever assembled in the north is that which in 700 met in the battle of Brávöll. It reached from Kjöge to Skanör, so that people could walk as on a bridge from Zealand over the Sound, a distance of some 20 miles. The fleet of the opposing force consisted of 2,500 ships.[12]

DEDUCTIONS.

In reviewing the preceding the question of parallelism between the ships of the North and those of ancient Greece and Rome, suggested in the beginning of this paper, may advantageously be introduced by a brief description of the more important points of similarity and dissimilarity of construction.

It has been shown that the war ship of antiquity was not a vessel of great depth, but that it was rather of slight build and of comparatively small weight, as is evident from the fact that it was often hauled ashore without the application of any special apparatus, and from the very short time often required for their construction.[13] They had a

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[1] Annal. Fuldens, a. h. a.
[2] English Chron.
[3] English Chronicle.
[4] *Ibid.*
[5] English Chronicle.
[6] *Ibid.*
[7] *Adam. Bremen*, i c ii c. 29, 317.
[8] English Chronicle.
[9] Encomium Emmae Reginae, in Langebek, Script. Rer. Dan. II, 476.
[10] English Chron.; Fagrskinna Saga i, c. 104; Olaf Trygvason Saga i, 89; Fornmanna Sögur.
[11] *Adam. Brem.*, II, c. 76; Encom. Emmae Reginae, 471; Chron. Saxon.
[12] *Worsaae:* Zur Alterthumskunde des Nordens, p. 91.
[13] It may be stated here that the (according to Polyb., I, 20, 9, 120, according to Orosius, IV, 7, 130) ships of Duilius and Scipio were built in sixty days, while (according to Polyb., I, 38, 5) only forty-five days were consumed in the construction of 220 ships for Hieron.

rather flat, slightly concave floor, and because of their moderate draft[1] they could venture into shallow water or easily land upon the shore.

The keel was generally of oak, and at its slightly upward bent ends the stem and stern posts were attached, and the connection strengthened by the insertion of a crooked timber. In the Nydam boat the connection is made by means of wooden pegs; in the Tune ship a close joint is made, while in the Gokstad ship a peculiar piece is inserted, bound to the keel by a scarfing and two rows of spikes.

In the Greek and Roman ships the ribs were seldom made of one piece, but were generally formed of three layers of timber securely bound together.[2]

The same process occurs in nearly all the northern ships that have become known to us. While in the Nydam boat the ribs which give the boat its shape are mostly in their natural crooked and irregularly bent shape, those of the Tune and Gokstad ships were built up of three different layers of wood, one above the other, joined together partly by wooden and partly by iron nails, the middle piece projecting. The same construction occurs in the beams, which rest on the top of the frames, where they are fastened to the overlying lower limbs of the knees and its continuation, and the ledge formed by the projection of the central piece is employed as support for the deck boards.

The ribs were not nailed to the keel, but lay loose above it, but various devices were adopted to keep them in their proper places. In the Greek and Roman ships they were fitted to the keel by notches cut in them, and were further held in place by the keelson, which, by means of notches cut in its under side, fits upon the ribs and prevents their lateral displacement. In the Gokstad ship this is in a measure effected by the fish-tail-shaped blocks which, straddling the frame timbers amidships across the 3 to 4, 6 to 12, 14 to 16 ribs, are held in place by the beams connecting them with the short ribs of the superstructure.

A further support is given to the ribs by the planking, which in the Greek and Roman ships was nailed to them, but in the Nydam, Tune, and Gokstad ships iron spikes were used only to nail the bottom plank to the keel and trenails to fix the top plank to the knees; the other planks, while riveted to each other, were tied to the frames through clamps left in the solid wood and corresponding holes in the ribs.

The Greek and Roman ships were additionally strengthened by supplemental external and internal planks at certain intervals, and internal perpendicular bolts. In the northern ships this is attained by double thickness allowed to certain strakes at points subjected to greater strain and by short frames or timbers going down from the gunwale of the Gokstad ship between each alternate pair of knees.

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[1] *Lemaitre:* Revue Archéol., p. 146; *Assmann:* Seewesen, p. 1616, 1626; also in Berlin, Phil. Wochenschrift, 1888, I, p. 28, estimate a greatest draft of 1.25 meters (4 feet).

[2] *Breusing:* Nautik der Alten, p. 33.

The rig was of simple nature, and although carrying one square sail, both mast and sail were taken down before battle or in making port.[1]

The Homeric ship carried one mast of fir, the foot of which, resting in a square hole in planks fastened upon the keel, found support in a frame formed of stout planks. In order to facilitate the lowering of the mast without unshipping it, the mast frame was open aft and extended to the sail thwart, a beam connecting the heads of a pair of ribs about amidships into which a semicircular excavation had been cut which afforded the mast support against the wind pressure.

In the northern ships the mast rests in oaken beams laid amidships along the keel and slotted to admit the frames; over this another oaken block cut to admit the beams. This block is clamped from the middle to each end and formed like a fish-tail. It is further fixed to the beams by knees of crooked timber heads and has a long opening in the back part to facilitate the lowering of the mast.

In consequence of their build and simple rigging the ships of antiquity are said to have resembled modern river ships rather than seagoing vessels,[2] and their main strength consisted in the rowing by which, independent of favorable wind, they were enabled to hurl themselves upon the enemy.[3] Consequently, the greater part of the ship was occupied by rowers with little accommodation for the crew.[4] Frequent landings, however, were made for the preparation of the meals[5] and for the night. According to the number of oars on each side the vessels were classed, and fifteen and twenty-five seaters appear to have been predominating in the southern seas in the sixth century B. C., while among the Scandinavians the sixteen and twenty seaters appear to have taken a prominent part as regular war ships.

In order not to disturb the lowering of the mast into the longitudinal space left for the purpose, the rowers' benches could not be placed across the entire ship, and they must be thought as loose boards or small seats extending along the inner board wall, in which case they were connected at one end to the board wall, and with the other end resting upon supports formed by longitudinal beams which, amidships, reached along the entire length of the ship.

In the Nydam boat—without mast—the thwarts were placed across the entire ship at the height of the frame heads, and at that height they may have served as seats for the rowers. In the Gokstad ship the beams rested upon the tenth strake—that is, about 30 inches above

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[1] *v. Henk:* Die Kriegsführung zur See, p. 22; Werner: Besprechung von Brunn's Axoros, in Göttingen gel. Anzeig., 1882, p. 237; Breusing: Nautik der Alten, p. 71.

[2] *Graser:* Philol., XXXI, p. 35.

[3] *Lemaitre:* Revue Archéol., 1883, I, p. 142.

[4] *Xenoph:* Oekonom., VIII, 5.

[5] *v. Henk:* Die Kriegsführung zur See, p. 23; *Cartault:* La trière Athén., p. 241; *Lemaitre:* Revue Archéol., p. 144; *Assmann:* Seewesen, p. 1626; *Thukyd.*, IV, 26; VIII, 26, 101; *Xenoph.*: Hell., I, 6, 26; II, 1, 27; Eyrbyggia Saga, c. XXXIX; Bergens Bylov, IX, 16.

the rowports—hence the rowing could not have been performed in standing but in a sitting position, and, although seats were not found in the ship, the very expression "sess," as designation of the class of vessels as resultant of the number of oars, indicates that the rowing must have been performed on seats, and that, consequently, thwarts must have existed.

In the Gokstad ship three stanchions appear in the central line, each stanchion being topped off with a cross-beam in which are two semicircular depressions. The middle stanchion is borne by a tripod spike fastened to the mast block; the other two rest on a square step in the bottom, after having passed through an aperture in the little fish-tail-shaped blocks between the beams, so that the stanchions could be removed at pleasure. The exact purpose of these stanchions has thus far been but very unsatisfactorily explained. It is known that a tent was spread over the ship, and these three stanchions have been thought to have been a support for the beams that served as a ridge. Nicolaysen,[1] however, says: "It may be a matter of doubt, and indeed seems hardly probable, that the three stanchions, and especially their cross-arm, had served as supports for the tilt's ridge, and it may be proper to add that before setting up the tilt the mast had to be lowered."

In my opinion, the exact meaning of the lowering of the mast does not imply its being unshipped and laid across the stanchions, since the mast alone, representing from 2,000 to 5,000 pounds in weight, would, for its lifting out of the socket and placing it upon the height of the stanchions, require greater force and more expeditious action, considering the occasion of its lowering, than could be expected of the limited crew represented in the ship, which did not carry one surperfluous hand.

A significant fact presents itself to my view in the height of the depressions in the cross-beams of the three stanchions, which are on a level with the neck of the stem and sternposts, the place at which, in the ancient Greek and Roman ships, a braided ring[2] was applied, through which the double hypozome cable, intended to prevent the breaking of the ship's back in transversely passing over the waves, were passed, and which were run over crutch-like supports along the central line of the ship. It is therefore, in my opinion, not impossible that the stanchions may have served the purpose indicated additional to crutch-like temporary supports, the material for which may be represented in the numerous round sticks[3] found in various places of the

[1] *Nicolaysen:* Langskibet fra Gokstad, p. 58.

[2] *Baumeister:* Denkmäler d. Klass. Alterth., III, p. 1604, Fig. 1671; Jahrb. d. K. D. Arch. Instit., 1889, 2 Heft, p. 100, Fig. 8.

[3] In his enumeration of the articles found with the Gokstad ship, Mr. Nicolaysen (Langskibet fra Gokstad, p. 37) describes some implements whose application does not appear to have been satisfactorily determined; among them are:

(*a*) Two large rough spars of fir resting on the cross-arms of the crutches or stanchions. (*Ibid.*, p. 37*b* and Pl. iv, Figs. 13, 14.)

(*b*) A round timber stock of pine, in standing position, having at one of its ends a perforated clamp. (*Ibid.*, p. 38*f* and Pl. iv, Fig. 11.)

Nydam, Tune, and Gokstad ships, and to which thus far no use has been assigned, although it has been suggested that they may have served as lateral supports of the mast, a mistake into which the investigators of the ancient Greek and Roman naval structures had also fallen until their application was practically illustrated.[1]

The most dangerous weapon of the ancient Greek and Roman ship was the spur which, in early times located below the water, appears to have been an invention of the Phœnicians, who used it in 700 B. C. The Greek located it above the water line.[2] Above the spur was a short ram,[3] representing the head of an animal, which prevented the spur from penetrating too deeply into the opposing vessel.

In Northern naval architecture, saga refers to a ship which was provided with a beard consisting of iron spikes applied to the prow;[4] one specimen only, however, has survived in the fir boat found at Nydam (Plate LXXV), in which a prolongation of the keel in either direction, at its juncture with the stem and sternposts, appears to have been fitted up as a spur and probably mounted with iron or bronze, although, owing to its long immersion in the morass of Nydam, all traces of the metal mounting have disappeared.

One of the most difficult problems in the discussion of Northern naval architecture is that of dimensions, there being but two instances in which the sagas give an account of the length; one of them is in the *Ormen-hin-Lange* (the *Long Serpent*), which is described as having carried thirty-four pairs of oars[5] by a length of keel of 116 feet, and the

(*c*) Six thin spars of pine or fir. The longest 7.2 meters, the second 5.30 meters in length, most likely not entire in any part, slightly thinned toward one end, but strongly at the opposite end; the third spar 4.27 meters long, with a like thinning, and at the other end hewn square; the fourth, having a round hole at each end; the fifth, 3.74 meters long, imperfect at one end, where it is hewn aslant, and having at the other end a hole; and, finally, the sixth, 3.20 meters long; its thickness entire at one end, and near that provided with a hole; round on the side toward the spar's upper end, but in the side toward the opposite end eight-lined. (*Ibid.*, p. 39*e* and Pl. iv, Fig. 12.)

(*d*) In the middle of the ship, and about 30 centimeters above its sides, a spar of fir broken toward the thicker end, and that was lying close to the wall of the sepulchral chamber and regularly tapered toward its other end. It probably first rested in the cross beams of the structure farthest aft, and at a later time it had been crushed downward together with the stanchion, and broken by the pressure of the overlying earth. (*Ibid.*, p. 44*a* and Pl. iv, Fig. 15.)

(*e*) Two slender poles of pine wood standing beside each other on the aft crosspiece of the sepulchral chamber against its wall; one of the spars cut straight at end, fitted with an iron spike, and evenly tapered toward its sharp end; the other from the middle, regularly tapered toward both ends, one of which is sharply pointed, whereas the other is broadened to a knob. Both of them were at the time of the exhumation well preserved and straight. (*Ibid.*, p. 44*b* and Pl. iv, Fig. 16; Pl. viii, Figs. 15, 15*b*.)

[1] *Luebeck Emil:* Das Seewesen der Griechen und Römer, p. 52.

[2] *Assmann:* Seewesen, p. 1613.

[3] *Montfaucon:* L'Antiquité Appliquée, iv, p. 214, Pl. 134.

[4] *Svarfdœla:* c. iv.

[5] *Torfœus:* Hist. rer. Norvegic, c. xxxiii; Jal: Archéol. Nav., I, 132; Du Sein: Hist. d. l. marine, *I, 43.*

long ship of Knut the Great, which, by a length of 300 feet, carried sixty pairs of oars.

The account of the *Long Serpent* is considered as somewhat exaggerated and it is classed among the thirty-seaters, but a little lower and narrower, and having a crew of about 300 men.[1]

An approximation may be had from the number of rowers' benches, the intervening spaces or divisions (*rúm*), and the specified number of men stationed therein. Reference to the longitudinal divisions (*rúms*) is made as follows:

Rand the Strong's *Dragon* had thirty rúm.[2]

Olaf Trygvason's *Trane* had thirty rúm.[3]

Long Serpent was 116 feet long; it had eight men in each half rúm.[4]

Aasbjorn Selsbane, of Trondhjem, had a snekka of twenty rúm that carried 99 men.[5]

Knut the Great's long ship had sixty pair of oars and was 300 feet long.

Harald of Hjøtø ship in the battle of Helgeaa had twenty rúms.[6]

King Eystein built a ship in size and shape like the Long Serpent.[7]

King Harald Hardradi's ship was as long as the Great Serpent and had thirty-five rúm.[8]

King Sverre's ship *Hárknífrin* had twenty-three rúm.

The *Mariasuðen* had thirty-two rúm.

The *Ognarbrand* had thirty rúm.[9]

Vidkunn Erlingsson's *Gullbringen* had twenty divisions.[10]

Erling Skjálgsson had a skeid which had sixty-four oars and carried two hundred and forty men.[11]

In the *Diere*, built by Erling Steinvæg, each half rúm had eight men.[12]

Thorlief gave his son Eirik a skuta with fifteen seats.[13]

Duke Skule's ship, *Good Friday*, had thirty-six rúm.[14]

Erling Skjálgsson had a twenty-seated snekkja.[15]

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[1] *Tuxen, N. E.*: De nordiske Langskibe, p. 128.

[2] Olaf Trygvason Saga, c. 88; Magnus the Good saga, c. 20.

[3] *Ibid*, c. 79.

[4] *Ibid*, c. 6; Munch, P. A.: Det norske Folks Historie, I, Bd. 2, p. 361.

[5] Heimskringla, 355; St. Olaf saga, c. xxiv.

[6] Heimskringla (ed. Unger, pp. 402, 428).

[7] Sigurd the Crusader Saga (Heimskringla text), xxvi.

[8] Harald Hardradi Saga, c. 61.

[9] Konungssögur, pp. 66, 77, 165.

[10] Flateyarbok ii, 600.

[11] Olaf Trygvason Saga, c. 105; St. Olaf Saga, c. 184; Heimskringla (ed. Unger), pp. 231, 414.

[12] Konungssögur (ed. Unger), p. 223.

[13] Olaf Trygvason Saga, c. 20.

[14] Flateyarbok ii, 121.

[15] Magnus Erlingsson Saga, c. 25; Olaf Trygvason Saga, c. 102; St. Olaf Saga, c. 60, 150.

Erling Skjálgsson had a fifteen-seated skúta.[1]

Eindrid the Young had a snekkja of twenty rúm.[2]

King Haakon's ship *Dragon* had twenty-five rúm.[3]

King Haakon's dragon *Mariasuðen* had thirty half rúm.[4]

King Haakon in his expedition to Scotland used a dragon of twenty-seven rúm.[5]

Bishop Haakon of Bergen ship had forty-five rúm.[6]

The smallest number of men stationed in a half rúm appear to have been two;[7] when three were employed, one was for rowing, the second to protect the rower, and the third to fight.[8] When extraordinary speed was required four men were placed at each oar,[9] while the largest number of occupants of a half rúm is given at eight men.[10]

It is evident that with an increase of occupants of each rúm or half rúm a corresponding increase had to be made in the dimensions, as shown in the Long Serpent, which, with thirty-four rúms, had a length of keel of 116 feet, while the ship of Knut the Great, with less than double the number of oars, measured 300 feet in length.

The vessels had five compartments, of which two were in the stern, namely, the lofting (*lypting*), in which the commander had his berth, and the foreroom (*fyrirrúm*), which was occupied by those next in rank, and which also served as storage place for the great armor chest;[11] two were in the stem, namely, the *hals*, *stafnlok* or *lokit*, in which the stem-defenders who bore the standard were quartered,[12] and aft of this the *sax*. The central part of the ship, around the mast, occupied by the rowers, was called *krapparúm*. With an increase in the number and size of the oars employed, and in the entire crew, additional accommodations had to be provided both for quarters and for the more successful plying of the oars, which, by an increased size demanded increased internal leverage. While thus in a sixteen-seater, with a crew of about seventy men (allowing two men for each half division[13]), the stem and stern compartments occupied about 30 to 32

[1] Magnus Erlingssons Saga, c. 25; Olaf Trygvason Saga, c. 102; St. Olaf Saga, c. 60, 150.

[2] Heimskringla (ed. Unger, cit. by Nicolaysen) p. 784.

[3] Flateyarbok III, 166.

[4] Ibid., 196, 197.

[5] Konungssögur (ed. Unger, cit. by Nicolaysen) p. 464.

[6] D. Norv VIII, No. 119.

[7] Flateyarbok I, 396; III, 41; Egils Saga, c. 58.

[8] Hakon Herdibreid Saga, c. 6; St. Olaf Saga, c. 48.

[9] Konungssögur (ed. Ungeri cit., by Nicolaysen) pp. 60, 465.

[10] Olaf Trygvason Saga; Munch, P. A; Det norske Folks Historie, I, Bd. 2, p. 371.

[11] Heimskringla, p. 709.

[12] *Ibid.*, p. 53; Egils Saga, c. 37.

[13] One for rowing, one for protection, one for fighting, according to Hakon Herdibreid Saga, c. 6; St. Olaf Saga, c. 48.

feet, leaving 48 feet in all, or 3 feet for each room longitudinally, the five-fold accommodations had to be provided for the crew of Knut the Great's ship,[1] in which eight men were stationed in each half division. Applying, then, a uniform scale throughout, each division should have occupied at least 4½ feet longitudinal space against 3 feet as in the sixteen-seater. Unsatisfactory and uncertain as this method may be, in the absence of other data it affords the only means of approximately computing the length of the ships.

The determination of width is still more difficult, there being in the sagas but one instance in which it is stated that a ship of thirty-two oars on each side (probably the *Mariasuðe* owned by King Sverre) for its passage required a channel of 7.53 meters (25 feet, 10 inches) to be cut through the ice.

A scale might be had in the length of oars, which for most effective rowing require an internal leverage of 1 against 2 to 3 external leverage. An oar of 18 feet, therefore, would require for its handling at least 6 feet internal space, or 12 feet for the two corresponding oars, and at least 5 feet should be added for the longitudinal central shaft in which the mast is to be raised and lowered, thus giving a width of ship of 17 feet for an 18-foot oar. (It may here be stated that in the Gokstad ship, fully described elsewhere, oars were found of 16 and 18½ feet in length, while the width of the ship is 16 feet and 10 inches.)

For the determination of height but one insufficient account exists additional to the known ships, this being in the ship built by Ealing Steinvaeg, Rider the Messenger, and Earl Philippus of Tunberg, in 1206, which was so high that "a man must be one of the tallest who, standing on the frames, could with his broadax touch the ceiling of the flooring."[2] The *Korsuðen* being built by Gunner in 1253, at Ravnholt in Bohuslen, was 4.23 meters (14 feet) above the water line,[3] and Bishop Haakon of Bergen, ship built in 1339 was 1.88 meters (6¼ feet) high.[4]

As explained in the preceding, actual finds have shown the longitudinal distance between the oars to have been 3 feet for the smaller vessels, gradually increasing to 4½ feet for the largest vessel, of which the saga has given an account; allowing them a constant of 16 feet for each, the stem and stern cabins, we are enabled to give an approximation of the length of the various classes of vessels.

The 13-seater would thus have a length of 71 feet; 15-seater, 77 feet;[5] 16-seater, 80 feet;[6] 20-seater, 92 feet; 22-seater, 98 feet; 23-seater, 101 feet; 25-seater, 119 feet; 27-seater, 126 feet; 30-seater, 137 feet;[7]

[1] Konungsögur (ed. Unger, cited by Nicolaysen, Langskibet fra Gokstad, p. 186).

[2] Konungs sögur (ed Unger, cit. by Nicolaysen) p. 223.

[3] *Ibid.*, p. 425, 426.

[4] D. Norv. VIII, No. 119.

[5] Actual length of Nydam boat, which is a 15-seater.

[6] Actual length of 16-seater Gokstad ship.

[7] Computed by *N. E. Turen:* De Nordiske Langskibet at 160.

32-seater, 152 feet;[1] 34-seater, 159 feet; 36-seater, 167 feet; 45-seater, 212 feet; 60-seater, 302 feet;[2] 64-seater, 318 feet.

The following table is a résumé of the length of the ships discussed in the preceding pages:

Locality.	Discovered and described by—	Year.	Length.
			Feet.
Botley, England	Brock	1875	130.00
Gokstad, Norway	Nicolaysen	1880	80.00
Nydam, Denmark	Engelhardt	1863	77.50
Tune, Norway	Rygh	1867	73.33
Storhaugen, Bergen, Norway	Lorange	1887	*66.66
Brösen, Danzig, Germany		1874	57.00
Vold, Borre, Norway	Nicolaysen	1852	53.33
Snape, England	Davidson	1862	48.00
Nydam, Denmark, ship's boat	Engelhardt	1863	55.00
Vendel, Upland, boat I	Stolpe	1881	34.66
Vendel, Upland, boat IX	....do	1882	31.70
Vendel, Upland, boat X	....do	1882	31.17
Vendel, Upland, boat XI	....do	1882	30.66
Vendel, Upland, boat VII	....do	1882	29.67
Gokstad, Norway, ship's boat	Nicolaysen	1880	*25.66
Gloppen, Bergen	Gustafson	1890	28.33
Vendel, Upland, boat IV	Stolpe	1882	26.66
Snotra Trondhjem	Undset	1874	25.00
Vendel, Upland, boat III	Stolpe	1882	24.66
Vendel, Upland, boat II	....do	1882	23.66
Snotra Trondhjem	Undset	1874	23.00
Valnesset Trondhjem	....do	1873	21.67
Vendel, Upland, boat VI	Stolpe	1882	21.67
Gokstad, ship's boat	Nicolaysen	1880	18.23
Kvelds, Norway	....do	1884	20.00
Nalum, Norway	....do	1887	19.00
Gokstad, ship's boat	....do	1880	13.66

* Keel.

WITHOUT IDENTIFICATION.

Lackalånga, Sweden	Bruzelius	1856	.....
Mökklebyst, Norway	Lorange	1887	.....
Ultuna, Upland	Nicolaysen	1855	.....
Thov, Nordland	Rygh	1853	.....

In considering the subject of ancient shipbuilding absolute dependence should not be placed in the accounts handed down in the sagas, which were often considerably overdrawn in an attempt to bestow praise upon the originator, or, if even correctly conceived, by transmission experienced modifications which finally were incorporated in the written records made at a much later period, and which formed the

[1] Long Serpent, according to saga account, was 160 feet in length.

[2] Knut the Great's ship is said to have measured 300 feet in length.

only sources of information until, within recent years, comparisons have become possible by the finding of ancient ships in a more or less perfect state of preservation. The knowledge gained from these structures has been employed by the late N. E. Tuxen,[1] director of the dockyard

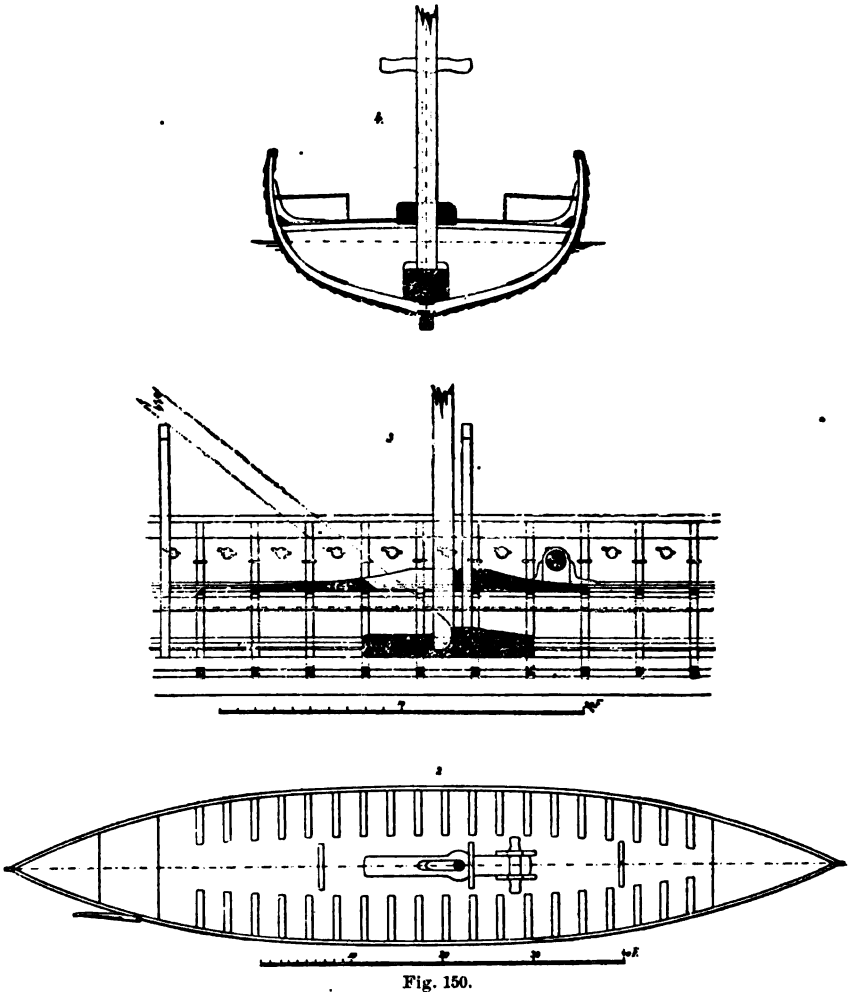

Fig. 150.

PLAN OF A PROJECTED "TWENTY-SEATER."
(Copied from N. E. Tuxen, "De nordiske Langskibe.")

at Copenhagen, Denmark, in preparing construction plans of two vessels of capacity often mentioned in the sagas. His résumé is appended in tabular form.

In order to obtain good lines and stability, the question of displace-

[1] *Tuxen, N. E.:* De nordiske Langskibe. In Aarb. f. nord. Oldk. og Hist. Copenhagen, 1886.

ment should be the first to be found, and this is obtained by computing the weight of the ship, together with all the material, crew, equipment, etc. In the present instance it is a 20-seater, that is a ship carrying twenty oars on each side, that engages our attention.

The dimensions of a 20-seater (Fig. 150) should be as follows: Length of keel, 71½ feet, with a curve of 6 inches; length between stems, 90 feet; width amidship, 17 feet; perpendicular height amidships, 8 feet, curving toward the prows, which are elevated several feet above the gunwale.

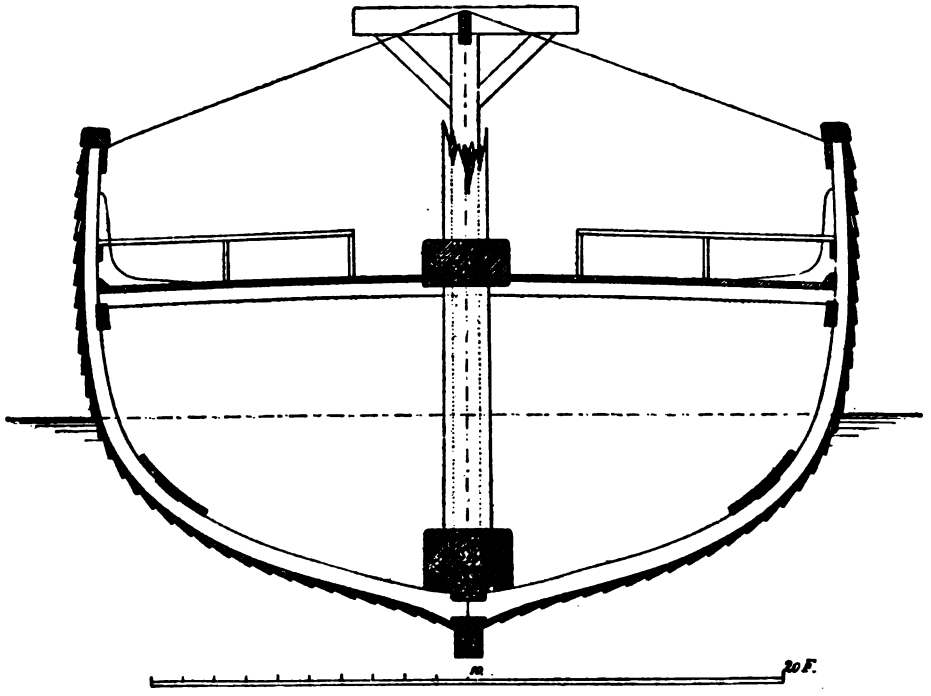

Fig. 151.

PLAN OF A PROJECTED "THIRTY-SEATER."

(Copied from N. E. Tuxen, "De nordiske Langskibe.")

The material employed to be oak or spruce with strong, stout ribs, keelson and gunwale; the planking 1¼ inches thick, fastened to the timbers with iron rivets. The deck in the hold 2 feet below the water line and 4 feet above the keel to be covered with boards 1½ inches thick, and represents an area 900 square feet. Upon it and resting against the ship's side are benches 5 feet long amidships, and decreasing toward the stems and from these the oars, twenty on each side, are plied through holes placed 3 feet above the water and 3 feet apart.

The seats are separated longitudinally by an opening 7 feet wide for the raising and lowering of the mast which by a height of 61½ feet and a weight of 2,000 pounds carried a sail that represented a surface of 1,400 square feet.

The forecastle room is 12 feet long, 10 wide, and 6½ feet high, and the cabin in the stern 15 feet long by 11½ feet high.

A crew of ninety men required for the ship together with accouterments and provisions for about four to six weeks weighs 24 tons.

The entire weight of the ship inclusive of crew and equipment is computed at 66 tons. The corresponding displacement is obtained by length of water line of 82 feet by 16 feet in width and a draft of 4¾ feet in the middle.

The 30-seater (Fig. 151) is constructed on the same general plans as the 20-seater, but is built stronger and having between each pair of ribs a short rib reaching to the water line.

The length of the ship is 120 feet keel with a curvature of 12 inches; length of hold 107 feet; between stems 160 feet; width 23½ feet, and depth amidships 9 feet, the gunwale curving 5 per cent bring the stems about 17 feet above water. The forward cabin is about 11 feet above the water, 22 feet long and 15 feet wide, while the stern cabin is 26 feet in length.

The deck, representing 2,000 square feet, is 4 feet above the water, and upon it are thirty seats upon each side, the twenty in the middle being 8 feet and the stem and stern banks only 5 feet wide, with an interval of 3½ feet between the oars which are plied through holes 6 feet above the water.

The central longitudinal space between the seats is 7 feet in width; the mast has a height of 80 feet weighing between 4,000 and 5,000 pounds and carries a sail representing a surface of 2,550 square feet.

The crew is estimated at two hundred and sixty men, which, with their accouterments and provisions, will weigh 118.3 tons; the weight of the ship, built of spruce, together with its equipment, is 153 tons; its water line is 144 feet in length by 23 feet in width and 7½ feet draft, representing a displacement of 271.3 tons.

The *Long Serpent*, according to Saga account, was a thirty-four-seater, and had a length of 74 ells. The ell, according to authority, is 1½ English feet; hence, length of ship is 111 feet. In a ship of that length the extreme breadth is computed at 22 feet, with a depth of 13½ feet, and a displacement of 296 tons.

The following table represents the results obtained by Mr. Tuxen[1] in computing and preparing construction plans for a twenty and a thirty-seater:

[1] *Tuxen, N. E.:* De nordiske Langskibe. In Aarb. f. nord. Oldk. og Hist. Kjöbenhavn, 1886.

Table showing dimensions and results of computation for projected vessels.

Specified details.	Twenty-seater.	Thirty-seater.
Length between stems	90′ 0″	160′ 0″
Length of keel	71′ 6″	120′ 0″
Width above gunwale amidships	17′ 0″	23′ 6″
Perpendicular depth from gunwale to keel	9′ 0″	15′ 6″
Draft at middle of keel	4′ 9″	7′ 6″
Draft at ends of keel	4′ 3″	6′ 6″
Gunwale above water amidships	5′ 0″	9′ 0″
Gunwale above water at stern	9′ 0″	17′ 0″
Length of uppermost water line	82′ 0″	144′ 0″
Width of uppermost water line	16′ 0″	23′ 0″
Area of uppermost water line, square feet	920	2,314
Area of middle rib, do	42.7	101.3
Displacement in cubic feet, cubic feet	2,085	8,614
Displacement center before the middle, tons	65.7	271.3
Metacenter above uppermost water line	5.405	6.204
Center of gravity of system above water line	1.941	2.493
Metacenter above center of gravity	3.464	3.711
Entire height of mast	61′ 6″	80′ 0″
Length of yard	36′ 0″	49′ 0″
Area of sail, square feet	1,400	2,550
Center of sail above center of pressure	38′ 875″	44′ 750″
Stiffness moment: sail moment	9′ 579″	17′ 650″
Deck above uppermost water line	1′ 0″	4′ 0″
Length of hold (kraproom)	61′ 0″	107′ 0″
Number of oars at each side	20	30
Distance between oars	3′ 0″	3′ 6″
Middle oar above surface of water	3′ 0″	6′ 0″
Length of middle oar	18′ 0″	30′ 0″
Crew in hold (kraproom)	80	220
Entire crew	90	206
Weight of crew, weapons, provisions, etc., tons	24.0	118.3
Weight of ship and equipment, do	41.7	153

These proportions are fully represented in the Gokstad ship, which so beautifully illustrates the art of shipbuilding in the north, and of which Mr. Nicolaysen on page 17 of his description of the northern Longship from Gokstad justly and proudly says:

"That there may yet be found in many parts of our country, near the coast, tumuli containing ships in tolerable preservation is by no means uncertain. . . . Certain, nevertheless, it is that we shall not disinter any craft which, in respect of model and workmanship, will outrival that of Gokstad. For, in the opinion of experts, this must be termed the masterpiece of its kind, not to be surpassed by aught which the shipbuilding craft of the present age could produce. Doubtless, in the ratio of our present idea, this is rather a boat than a ship; nevertheless, in its symmetrical proportions and the eminent beauty of its lines is exhibited a perfection never since attained until, after a much later but long and dreary period of clumsy unshapeliness, it was once more revived in the clipper-built craft of our own country."

FIRST DRAFT OF A SYSTEM OF CLASSIFICATION FOR THE WORLD'S COLUMBIAN EXPOSITION.

By G. BROWN GOODE, LL. D.
Assistant Secretary, Smithsonian Institution, in charge of U. S. National Museum.

(Submitted to the Hon. Thomas W. Palmer, President of the World's Columbian Commission, September 1, 1892.)

The paper now submitted is emphatically *a first draft*,* and should its general features meet with approval, it must still require careful revision and some rearrangement before it can be said to be ready for actual use. The time allowed for its preparation has been very short, and I have not had sufficient opportunity for conference with certain experts whose critical revision of the groups with which they are individually familiar is essential to the perfection of the plan.

I am aware that some of the groupings proposed may probably be unsatisfactory to the representatives of special interests, manufacturing or commercial, who will feel anxious to have all of the exhibits in which they are interested kept together. The textile men, for instance, may wish to have felt hats exhibited with other articles of felt, rather than in the department of costume; the wool men may desire a special collection of wool and *all* its products; the printing trade may expect to have printing presses shown by the side of paper and books, rather than with machinery in motion. In such cases as these, concessions and changes may be made, for intending exhibitors have rights which must be carefully regarded.

Many millions of visitors will see the Exposition, and it is for the visitors' interest especially that the objects on exhibition ought to be arranged. They should be selected and installed, first of all, with reference to attractiveness. Visitors must be drawn from every village in America, and after coming to Chicago must be led to visit the Exposition repeatedly, and to examine the displays in as many as possible of the thou-

* Special acknowledgments are due to Prof. W. O. Atwater, Prof. Otis T. Mason, Mr. J. Elfreth Watkins, Dr. Cyrus Adler, Col. G. E. Gordon, Mr. R. E. Earll, and Mr. W. V. Cox for advice and criticism in connection with the work of preparing the system of classification.

Acknowledgment is also due to Prof. Melvil Dewey, the author of the "Decimal Classification and Relative Index for the Arrangement of Libraries." His book has been constantly in my hands for several years, and its great usefulness in the handling of books and literary material suggested the desirability of forming a similar plan for use in the arrangement of Exhibition material.

sand classes. First of all, I repeat, *visitors must be induced to come to the Exposition and to look at the exhibits.* The next thing to be accomplished is, *by means of careful installation and labeling, to make each object teach some useful lesson.*

The interest of the exhibitors is identical with that of the managers in this respect, and their coöperation in this higher class of exhibition work is indispensable to its success.

The classification scheme of every important exhibition of the past forty years has been studied for the purpose of embodying in the present plan the best features of all which have preceded it, and it is my hope that, after this has been modified to meet the special needs of the coming Exhibition in Chicago, it will prove to be thoroughly available in practical use.

I need scarcely remind you that no rules for the construction of exhibition classifications have ever been formulated. No two persons can possibly arrive at the same results in preparing a plan of arrangement, and it is unlikely that any scheme can ever be fully satisfactory to all. A plan of classification is a matter of compromise and convenience, and the only test of its value is in its practical working.*

An attempt has been made to present in this plan of classification a certain logical sequence of ideas. This sequence is perhaps somewhat obscured by the combination of many quite distinct groups in a few primary divisions, and a general review of the arrangement is therefore given.

A primary division into ten groups or departments is proposed. Their composition is shown in a general way below, as follows:

PRIMARY OR PRODUCTIVE ARTS.

1. *Agriculture and Allied Industries,* including—
   Agriculture, in a limited sense.
   Viticulture.
   Horticulture and gardening.

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* A *unit of classification* is not necessarily a *unit of installation.* Your officials in charge of installations may at any time combine a number of classes, or combine all the classes in a division for purposes of exhibition. Similar combinations will of course be made for jury work.

Please note particularly the possibilities in connection with Department 10, to which, in the form of *Collective Exhibits,* the management may assign, for monographic display, in separate halls or buildings, special subjects for which such treatment is desired.

When, for any reason, it is decided to remove a given group of objects from the place where it logically belongs, to some other place where it is more convenient to display it, it is possible by a system of cross-references in the catalogues and on the labels to keep its other relationships in the mind of the visitor. Indeed, it is often desirable to exhibit the same class of objects twice in different relationships. Cotton in the bale, for instance, is a *final product* of agriculture and the *raw material* of one of the textile industries, and for purposes of exhibition belongs in both departments, although, possibly, subject to jury award only where it appears as a product; and there are many similar cases with which you are of course familiar.

The importance of the cross-reference system, then, is very great.

1. *Agriculture and Allied Industries*, including—
   - Forestry (including, perhaps, the wood-working industries.)
   - Stock-raising, poultry, etc.
   - Dairy industries.
   - Minor animal industries.
   - Hunting and trapping for profit.
2. *The Mines and Metallurgy*, including—
   - Mining.
   - Metallurgy and metal-working (simple products only).
   - The quarries and stone-working.
   - Water and ice supply.
3. *The Fisheries*, including also, for reasons of installation, all marine and aquatic interests, as follows:
   - The fisheries.
   - Fish culture.
   - Vessels and boats.
   - Life-saving and subaquatic operations.

SECONDARY OR ELABORATIVE INDUSTRIES.

4. *Manufactures and Elaborative Industries*,* including—
   - Motors of all kinds.
   - Machinery in motion.
   - Railway plant.
   - Vehicles of land transportation.
   - Electricity and its application.
   - The chemical industries.
   - Pottery and glass-making.
   - The metal-working handicrafts (partly also under Mines and Metallurgy).
   - The wood-working industries (perhaps to be arranged under Forestry).
   - The stone-working industries and masonry (perhaps to be arranged with Mines and Metallurgy).
   - Fur and leather working.
   - The textile industries.
   - Paper manufacture.
   - Other industries and machines.

UTILIZATION OF RESOURCES AND MATERIALS.

5. *Food and its accessories*, including—
   - Food substances and cookery.
   - Beverages.
   - Tobacco and other narcotics.†
6. *House and dress*, including—
   - Domestic architecture and house-fitting.
   - Furniture (of dwellings and public buildings).
   - Heating, lighting, and ventilation.
   - Costume and its accessories, and the toilet.
   - Jewelry and trinkets.

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*The subordination of so many important industries under one general head may at first sight be deemed inadvisable. It should be borne constantly in mind, however, that *a system of classification is only a device to facilitate administration*, and that the subordination of a given subject and the size of the types in which it is printed in the classification, have no relation whatever to its relative importance.

†This grouping may seem inappropriate, but it is that which for forty years has, for reasons of convenience, been adopted by exhibitions.

"Liberal Arts" of the French classifications and much more).

8. *Social relations and public welfare* (physical and social condition of man).
   Folk-lore and ceremony.
   Communication and record of ideas (language, writing and printing. Books not shown as literature).
   Engineering and constructive architecture.
   Property, trade, commerce, and intercommunication.
   Recreation and amusement.
   Music and musical instruments. The theater.
   Medicine, surgery, pharmacology, hygiene.
   Public convenience and safety.
   Government and law.
   Societies and federations.
9. *Science, religion, education and human achievement* (intellectual and moral condition of man).
   Institutions and organizations.
   Science (research and record).
   History and biography. Representative men.
   Literature and books.
   Journalism.
   Religious organizations
   Primary education.
   Secondary instruction.
   Superior instruction.
   Human achievement.
10. *Collective or monographic exhibits.*
   Collective exhibits of foreign governments.
   The Government of the United States. Collective exhibit of the Government Departments.
   American States and cities.
   The woman's department.
   Collective exhibits, isolated by the board of management for reasons of con-

blies of experts, bringing together in council wise men of all nations, were most successfully carried out at Paris. These were in many respects the most important features of the exhibition, and were so regarded by its management.

In the meantime the old system of competitive awards and medals has been falling into disfavor, just as similar methods are going out of educational institutions. What was once the chief feature is now only an incidental one, and, although doubtless still a necessary accompaniment of exhibitions, it is one which is usually a source of dissatisfaction to all concerned.

The theatrical features, at one time in favor in exhibitions, are less effective than in the past; unmeaning and pretentious display is not advantageous. Stupendous towers, barrels as big as houses, temples of cigar boxes, or armorial trophies of picks and shovels, though they have their uses for advertising purposes, and, it may be, for decoration, are matters of but the slightest importance in an exhibition which is intended to commemorate the anniversary of a great historical event.

The historical and educational idea is the one which seems to be most in keeping with the spirit of America at the present time, and no great exhibition has by any means exhausted the possibilities of effective work in this direction, wherein seems to lie the chief opportunity of doing something which has not already been magnificently done elsewhere.

The public has a lofty ideal for the Columbian Exposition. The tendency of thought has been well set forth in the admirable letters by Mr. Edward Atkinson to the New York Tribune on the subject of the plan of the World's Columbian Exposition, and in the interest manifested in the essay of M. Berger, the director general of the Paris Exposition, recently published in the Century Magazine. The Chautauqua movement and the National Agricultural Experimental Station enterprise illustrate the demand of the public for concrete information, and that of the highest order.

The visitors to the National Museum in Washington are numbered by hundreds of thousands and come from every portion of the United States. The Museum is, in a certain way, a permanent exposition of science and industry. Time after time new features have been introduced, seemingly in advance of the public taste, yet in every case the people have not only appreciated the idea at once and been pleased with it, but have also shown by their comments and suggestions and generous aid how further advances might be made in the same direction.

Please allow me to refer once more to the subject of labels and labeling. By a label I mean not merely the card attached to a given article, giving its name and that of its exhibitor: I mean all illustrative and explanatory matter displayed in connection with any group of objects, such as placards, pictures, maps, and books, placed where the visitor can use them. I once attempted to make a definition of a museum—an ideally useful museum—in the following words:

*"An efficient educational museum may be described as a collection of instructive labels, each illustrated by a well-selected specimen."**

The same principle, with obviously necessary modifications, may be said to be applicable in the administration of exhibitions.

A live exhibition is one in which each group of objects is made intelligible and instructive by the constant presence of a staff of experts to explain the teachings of the objects on view, and by an effective system of labels and explanatory placards.

The exhibition of the future will be an exhibition of ideas rather than of objects, and nothing will be deemed worthy of admission to its halls which has not some living, inspiring thought behind it, and which is not capable of teaching some valuable lesson.†

A leader in the educational work of America writes to me in the following words:

> In the history of no nation before has there been such a thirst for knowledge on the part of the great masses of the people, such a high appreciation of its value, and such ability and readiness to acquire and use it. No other people get so much of education from what they read and see. No other nation has so large a body of citizens of high intelligence; never before has the public been so willing, and indeed, so anxious to receive with respect and use with intelligence the information which the thought and experience of the age are furnishing; never before have that thought and experience had so much to give. Let the Exposition be a display not merely of material products, but of the teachings of science and experience as regards their value, importance, and use.
>
> The Exposition should be not merely a show, a fair, or a collossal shop, but also and preëminently, an exposition of the principles which underlie our national and individual welfare, of our material, intellectual, and moral status; of the elements of our weakness and our strength, of the progress we have made, the plane on which we live, and the ways in which we shall rise higher. It should be an exposition of knowledge, illustrated by the material objects shown. It should teach not only to our people, but to the world, what a young republic, with all the crudeness of youth, but heir to the experience of the ages, has done in its brief past, is doing in the present, and hopes to do in the greater future for its people and for mankind.

These are lofty ideals, but I believe that those of the principal promoters of the Chicago Exposition, and of the members of the World's Columbian Commission, are not less comprehensive.

The occasion is an inspiring one, and it may well be that the world will witness in Chicago the greatest of international exhibitions.

Very respectfully,

G. BROWN GOODE.

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* Smithsonian Report, 1881, p. 85.

† The labor and thought required will be very great, and the expense will be not inconsiderable. Not only the advice but the active coöperation of the best talent of the country will be necessary. Services of this character will be required, not only in bringing the material together, but still more in its installation, and in the preparation of adequate labels, handbooks and catalogues.

Should a system of salaried jurymen, such as that recommended by Mr. Porter, be adopted, some of these men will doubtless be able to render professional and expert service of other kinds to the Exhibition.

GROUPS OR DEPARTMENTS.

1. **Agriculture and Allied Industries.** (Agriculture, Horticulture, Forestry, Stock-Raising, Etc.)
2. **The Mines and Metallurgy.**
3. **Marine and Fisheries.**
4. **Manufactures and Other Elaborative Industries.** (Machinery, Processes, and Products.)
5. **Food and Its Accessories.**
6. **The House and Its Accessories. Dress and Personal Equipment.**
7. **The Pictorial, Plastic, and Decorative Arts.**
8. **Social Relations and Public Welfare.**
9. **Science, Religion, Education, and Human Achievement.**
10. **Collective Exhibits.**

DEPARTMENT 1.—AGRICULTURE AND ALLIED INDUSTRIES.

DIVISIONS.

10. THE SCIENCE AND PRINCIPLES OF AGRICULTURE.
11. FARMS, BUILDINGS, TOOLS, AND MACHINERY.
12. CULTURE OF CEREALS, GRASSES, AND FORAGE PLANTS, ETC.
13. CULTURE OF TOBACCO, TEXTILE PLANTS, ETC.
14. VITICULTURE AND ITS PRODUCTS.
15. ECONOMIC HORTICULTURE—VEGETABLES AND FRUITS.
16. ORNAMENTAL AND RECREATIVE HORTICULTURE, WINDOW GARDENING, ETC.
17. FORESTRY AND FOREST PRODUCTS.
18. DOMESTICATED ANIMALS, STOCK-RAISING, THE DAIRY INDUSTRY, ETC
19. THE MINOR ANIMAL INDUSTRIES.

DEPARTMENT 2.—THE MINES AND METALLURGY.

DIVISIONS.

20. THE SCIENCE OF MINES. ECONOMIC GEOLOGY AND MINERALOGY.
21. MINE ENGINEERING.
22. MINING AND METALLURGICAL TOOLS AND MACHINERY.
23. SELECTED MINING INDUSTRIES—SPECIAL MONOGRAPHIC EXHIBITS.
24. QUARRYING AND STONE-WORKING.
25. COAL, PETROLEUM, AND NATURAL GAS.
26. WATER AND ICE. SURFACE DEPOSITS.
27. METALLURGICAL AND METAL-WORKING PRODUCTS.
28. MINE PRODUCTS, NOT CLASSED ELSEWHERE.
29. MINERS, QUARRYMEN, AND OPERATIVES.

38. Fish Culture and Acclimatization.
39. Life-Saving and Subaquatic Operations.

DEPARTMENT 4.—MANUFACTURES AND OTHER ELABORATIVE INDUSTRIES.*

DIVISIONS.

40. Machinery and Motors.
41. Machinery, Etc. (Continued). Railway Plant.
42. Electricity and its Applications. A Monographic Exhibit.
43. Chemical Manufactures, Oils, Soaps, Waxes, Glues, Paints, Dyes, Etc. Painting and Dyeing.
44. Pottery and its Manufacture.
45. Glass and Enamels.
46. Metal-Working Handicraft—Clocks and Watches, Cutlery and Other Products.
47. Furs and Leathers. Tanning and Currying.
48. The Textile Industries.
49A. Paper Manufacture and its Applications.
49B. Applications of Animal, Vegetable, and Mineral Materials Not Elsewhere Classed.

DEPARTMENT 5.—FOOD AND ITS ACCESSORIES.

DIVISIONS.

50. The Science of Food and Nutrition.
51. Animal Foods and Products From Them.
52. Vegetable Food Products.
53. Sugar. Confectionery. Fats and Oils.
54. Food Adjuncts. Condiments and Stimulants.
55. Beverages and Materials for Beverages.

DEPARTMENT 6.—THE HOUSE AND ITS ACCESSORIES, COSTUME AND PERSONAL EQUIPMENT.

DIVISIONS.

60. CITIES, TOWNS, AND VILLAGES.
61. DOMESTIC AND ECONOMIC ARCHITECTURE—DOMESTIC APPLIANCES.
62. INTERIOR ARCHITECTURAL FIXTURES AND DECORATION.
63. FURNITURE OF THE DWELLING HOUSE.
64. FURNITURE AND FIXTURES FOR PUBLIC BUILDINGS.
65. HEATING, LIGHTING, VENTILATION, AND WATER SUPPLY.
66. COSTUMES AND PARTS OF COSTUMES.
67. JEWELRY AND TRINKETS.
68. THE TOILET AND ITS APPLIANCES.
69. ACCESSORIES OF COSTUME AND PERSONAL EQUIPMENT.

DEPARTMENT 7.—THE PICTORIAL, PLASTIC, AND DECORATIVE ARTS.

DIVISIONS.

71. PHOTOGRAPHY.
72. PHOTO-MECHANICAL AND OTHER MECHANICAL PROCESSES OF ILLUSTRATING.
73. THE DECORATIVE ARTS.
74. SCULPTURE.
75. ARCHITECTURE (AS A FINE ART).
76. ENGRAVING, ETCHING, AND LITHOGRAPHY.
77. DRAWING.
78. PAINTING IN WATER COLORS, ETC.
79. PAINTING IN OIL.

DEPARTMENT 8.—SOCIAL RELATIONS AND PUBLIC WELFARE.

DIVISIONS.

80. FOLK-LORE.
81. COMMUNICATION AND RECORD OF IDEAS.
82. ENGINEERING AND CONSTRUCTIVE ARCHITECTURE.
83. PROPERTY, TRADE, COMMERCE, AND INTERCOMMUNICATION.
84. RECREATION AND AMUSEMENT.
85. MUSIC AND MUSICAL INSTRUMENTS. THE THEATER.
86. MEDICINE. SURGERY. PHARMACOLOGY. HYGIENE.
87. PUBLIC CONVENIENCE AND SAFETY.
88. GOVERNMENT AND LAW. THE ART OF WAR.
89. SOCIETIES AND FEDERATIONS.

DEPARTMENT 9.—SCIENCE, RELIGION, EDUCATION, AND HUMAN ACHIEVEMENT.

DIVISIONS.

90. INSTITUTIONS AND ORGANIZATIONS.
91. SCIENCE (RESEARCH AND RECORD).
92. HISTORY.
93. LITERATURE AND BOOKS.
94. JOURNALISM.
95. RELIGIOUS ORGANIZATIONS.
96. EDUCATION, PRIMARY.
97. EDUCATION, SECONDARY.
98. EDUCATION, SUPERIOR.
99. HUMAN ACHIEVEMENT.

WHICH HAVE CONTRIBUTED LARGELY TO THE PEOPLING OF AMERICA.

109. SPECIAL COLLECTIVE EXHIBITS TO BE ARRANGED FOR BY THE COMMISSIONERS.

DEPARTMENT 1.—AGRICULTURE AND ALLIED INDUSTRIES.

10. The Science and Principles of Agriculture.

100. THE HISTORY OF AGRICULTURE.
- Retrospective exhibits.
- Agriculture of the past.
- Agriculture of other countries not elsewhere assigned.
- Agriculture of the Indians.
- Western ranch life. Frontier life.

101. AGRICULTURAL SCIENCE AND EDUCATION.* EXPERIMENT STATIONS.
- History of the development of experimental agricultural science.
- Experiment stations of the United States and other countries.
- Agricultural geology, physics, chemistry, and biology. (Economic botany and zoölogy.) Physiology of plant and animal life. Agricultural meteorology.
- Literature of agricultural science.

102. AGRICULTURAL RESOURCES.
- Resources by geological formations.
- Resources by regions.

103. SOILS.
- Classified by characters and by regions.
- Experimental exhibits.

104. SYSTEMS OF TILLAGE.
- Planting and cultivation. Rotation.

105. DRAINAGE.

106. IRRIGATION.

107. FERTILIZERS AND THEIR APPLICATION.

II. Farms and Farmers. (Agricultural Engineering and Architecture. Buildings, Tools, and Machinery.)

110. HISTORY OF FARMS.

Systems of land-ownership among early peoples, with reference to history of systems of tillage and primitive methods of government. Land and village systems of the early Germans and English.

Maps and plans of ancient farms and farm communities.

Plans of early farm buildings not elsewhere shown.

Historical exhibits relating to other rural occupations.

111. FARM LANDS.

Maps and statistics showing relation of agriculture to other industries.

Areas of agricultural holdings in various States and countries.

Percentages of population, agriculturists to others.

Sizes of farms and holdings.

Statistical exhibits of all kinds, showing the utilization of land for productive industry.

Prices of land in various localities. Renting values. Land grants (treated historically and statistically). Individual grants. Homestead grants. Timber grants. Military and other bounty grants.

Grants to corporations. Railroad grants and their relation to agricultural occupation.

Exhibits showing increase or deterioration of productive value of land in various localities.

Railways and other transportation systems in relation to the agricultural lands of various localities.

112. THE FARMER. HIS RELATIONS TO THE COMMUNITY AND HIS CONDITION AND PRIVILEGES, PAST AND PRESENT.

Social and economical condition.

Special and economical statistics. Capital in agricultural investment. Profits of agriculture. Wages of agricultural laborers.

Farm literature; agricultural and rural books and journals.

113. FARM ENGINEERING.

Maps of farms and farming regions, showing road systems, locations of buildings, utilization of water supply, etc.

Laying out and improving farms.

Local irrigation and drainage—drain tiles.

Fences and gates—models and plans.

Farm roads and bridges—systems of construction for country roads.

Water and tide gates. Drains and embankments. Outfalls.

Wind-mills, water-wheels, and other motors and power appliances for farm uses.

Stack building and thatching.

114. THE FARM HOUSE.

Plans and pictures showing farm houses for all localities, interior and exterior, with all appliances.

Furniture of all kinds for farm-houses.

Farm cottages and tenements and other dwellings for farm-laborers, with their fittings.

Log cabins and other dwellings for Southern farm-laborers.

Appliances of domestic industry, peculiar to the farm-house.

Pictures and other representations of farms and farm-houses, memorable as the places of birth or residence of famous men.

115. FARM BARNS AND OUT-HOUSES.

Barns in general: plans, sections, elevations, photographs, and models.

Representations of groups of farm buildings.

115. FARM BARNS AND OUT-HOUSES—Continued.

Stock barns, stables, and folds. Poultry houses, apiaries, cocooneries. Piggeries. Kennels.

Hay barns, ricks, barracks.

Vegetable store-houses, silos.

Granaries, fruit-driers, smoke-houses.

Dairy buildings, spring-houses, ice-houses.

Tool-houses, wagon-houses.

Hot-houses and other accessories of farm horticulture.

Slaughter-houses, compost-houses, manure-pits.

116. AGRICULTURAL TOOLS AND AGENCIES.

Implements of clearing: Woodman's tools—axes, etc. Stump and root pullers. Stone implements.

Implements of tillage: Manual implements—spades, hoes, rakes. Animal power and machinery—plows, cultivators, horse-hoes, clod-crushers, rollers, harrows. Steam-power machinery—plows, breakers, harrows, cultivators. Digging and trenching machines.

Implements for planting: Manual implements—corn-planters and hand-drills. Animal power—grain and manure drills, corn and cotton planters. Steam-power machinery—grain and manure drills.

Implements for harvesting: Manual implements—scythes, grain cradles, reaping hooks, sickles. Animal-power machinery—reapers and headers, mowers, binders, tedders, rakes, hay-elevators, and hay-loaders. Potato diggers.

Implements used preparatory to marketing: Flails, thrashers, clover-hullers, corn-shellers, winnowers; hay, cotton, wine, oil, and sugar making apparatus.

Implements applicable generally to farm economy: Portable and stationery engines, chaffers, hay and feed cutters, slicers, pulpers, corn mills, farm boilers and steamers, cider presses.

Dairy fittings and appliances: Churns for hand and power, butter-workers, cans and pails, cheese presses, vats and apparatus.

Wagons, carts, sleds, harness, yokes, traction engines.

Apparatus for road-making and excavating.

117. FERTILIZERS.

Phosphates, potash salts, nitrogen compounds, ashes, marls, and plasters, etc.

Cotton seed, fish scrap, etc.

Manufacturing establishments.

Statistics of trade and consumption.

Farm manures and their value. Production. Management. Application.

118. AGRICULTURAL SOCIETIES AND LEAGUES.

Literature and statistics. History.

Departments and boards of agriculture.

The Grange, the Wheel, the Alliance, the League, and other farmers' societies.

119. AGRICULTURAL FAIRS AND EXHIBITIONS.

Literature and statistics. Pictures.

12. Cereals, Grasses, and Forage Plants.

Under each head are to be shown the natural history of the plant under consideration; theories and methods of culture, past and present; peculiar implements for its tillage, planting, harvesting, preservation [ensilage], preparation for market, and specimens of the final products as ready for the market.

In special instances, as in the tobacco class, for instance, it may be found advisable to install in this section the methods and products of its final treatment.

Pictures and other illustrative exhibits to be shown in each class.

121. INDIAN CORN. (MONOGRAPHIC EXHIBIT.)

Natural history of Indian corn. Varieties, and their history. Geographical distribution of corn-culture. Corn-culture in other countries. Maps, retrospective and for the present.

Culture and use of corn by the American aborigines. Instruments of tillage and utilization. Stone hoes and spades. Mortars and pestles. Aboriginal forms of use. Hominy, samp, pones, succotash, and their history.

Planting, tillage, and harvesting of corn. Husking and shelling tools.

Exhibits of all varieties of corn.

Utilization of the grain. Exhibits of all food products: Flours, meals, hominies, popcorn preparations; also cooked preparations, so far as practicable.*

Utilization of stalks and husks. Stuffings. Mats, brushes, horse collars, and other domestic manufactures. Broom-corn and its uses.

Distillation of corn, alcohols, whiskies, etc.

Folk-lore and legend of corn. Shucking bees. Indian ceremonials. Literature of corn. Corn as a motive in the decorative arts, etc.

122. THE SUGAR CANE AND SORGHUM.

Treatment as for Indian corn.

If a monographic display is desired, molasses and cane sugar and rum might be shown, and even the preparation of sugar and its utilization in general.†

Sorghum, its culture and applications included here.

123. THE OLD WORLD CEREALS.‡

Wheat, rye, barley, oats, etc.

124. RICE AND ITS CULTURE.

125. THE GRASSES.

Hay and its management.

126. THE FORAGE PLANTS.

Clover, alfalfa, cowpea, and other leguminous species.

Other forage plants.

127. FARM GARDENING.

Field culture of esculent plants and roots.

Peanut culture.

128. TROPICAL PLANTING, NOT ELSEWHERE CLASSED.

Tapioca, arrowroot, etc.

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*A special temporary exhibition might be held for the display of all cooked preparations of this peculiarly American grain, in connection with a monographic display of all other matters connected with its history and uses.

† By building a light protection of glass and an occasional use of steam, it would be possible to show all the operations of a Southern sugar plantation—planting and raising the cane, gathering and making the molasses, etc.—on the Exposition grounds, employing a characteristic gang of Southern negroes, who would form a most peculiar and interesting feature of the exhibition.

‡ Under wheat, Assistant Secretary Willits, of the Department of Agriculture, suggests an exhibit of varieties grown in this country and other parts of the world, accompanied by data which will bring out the effects of climate, soil, culture, and other conditions upon the size, shape, color, weight, hardness, chemical composition, and other properties of the grain which decide its value for milling, cooking, and nourishment. The ultimate object would be to determine and illustrate for different varieties the quantity and quality of produce, changes under influence of varied conditions, and the adaptations of varieties to different localities.

Monographic displays possible.
Primitive spinning, on old wheels, and modern methods.
Hatchels and combs.
A rope-walk of the old style by the side of modern machinery.
Net making, by hand and by machinery.
Primitive looms and weaving.

134. OTHER TEXTILE PLANTS AND THEIR CULTURE.
Jute, ramie, etc., etc.

135. HOPS, TEA, COFFEE, SPICES, AROMATIC HERBS, ETC.
Culture and preparation.

136. INDIGO AND OTHER DYE PLANTS AND THEIR CULTURE.

137. CINCHONA AND OTHER MEDICINAL PLANTS.
Acclimatization of cinchona in Africa and the South of France, and Eucalyptus in California and elsewhere.

138. OPIUM AND ITS CULTURE.
The opium trade.

139. OTHER MEDICINAL PLANTS.
The castor bean, etc.

14. Viticulture.

140. VITICULTURAL ECONOMICS.
The natural history of the vine.
Enemies of the vine and their prevention.
Folk-lore and history of the vine.

141. VARIETIES OF THE VINE.
Collections of vines and illustrations of the varieties.

142. SYSTEMS OF VITICULTURE AND VINE TRAINING.
Implements. Trellises and supports.

143. GRAPE RAISING FOR THE FRUIT MARKET.

144. THE RAISIN INDUSTRY.
Methods of drying and packing.
Statistics of trade.

*15. Economic Horticulture (Vegetables and Fruits.)**

150. GARDEN ECONOMICS.
- Soils and fertilizers.
- Principles of gardening.
- Tools and appliances as distinct from those of agriculture.
- Folk-lore and history of gardening.
- Species of vegetables and specimens of cultivation, indicating the characteristic types of the kitchen gardens and fruit gardens of every country.

151. HOT-HOUSES, ETC., FOR GARDENING.
- Plans and drawings.
- Devices of construction. Arrangement of glass.
- Interior fittings. Methods of heating.

152. PULSE, CEREALS, AND FRUIT-LIKE VEGETABLES.†
- Beans of all kinds.
- Okra, martynia, peppers, tomatoes, etc.
- Squashes, pumpkins, melons, etc.
- Sugar-corn, etc.

153. PLANTS CULTIVATED FOR SPROUTS AND LEAVES, BUDS AND FLOWERS.
- Asparagus, cabbage, cauliflower, endive, kohl-rabi, lettuce, rhubarb, spinach, sprouts of all kinds, etc.
- Capers, nasturtiums, onions, etc.

154. ROOTS, TUBERS, ETC.
- Artichokes, carrots, egg-plants, parsnips, potatoes, radishes, salsify, turnips, yams, etc., etc.
- Cryptogamic plants—mushrooms, truffles, tuckahoe.

155. POMOLOGY OF TEMPERATE AND TROPICAL REGIONS.
- Culture of apples, pears, quinces, peaches, nectarines, apricots, plums, grapes, cherries, strawberries, melons, etc.
- Culture of oranges, bananas, plantains, lemons, pine-apples, pomegranates, figs, cocoanuts, etc.

156. NUTS AND NUT-LIKE SUBSTANCES, SPICES AND CONDIMENTS, AND THEIR CULTURE.
- Nuts of all kinds.
- Pits, as almonds and pistachio nuts.
- Tubers, as peanuts.
- Berries, fruits, seeds, buds and leaves.
- Barks and roots used for flavoring.
- Aromatic herbs.

157. GARDEN SEEDS, PRODUCTION AND COMMERCE.
- Seed-raising. Methods and appliances.
- Special exhibition of seeds, and methods of preparation, labels, etc.
- Tests of purity and vitality.
- Statistics of trade.

158. MARKET AND TRUCK GARDENING.
- Statistics and history.
- Special methods in the vicinity of different towns.

159. THE FRUIT AND VEGETABLE MARKET.
- Packing and transportation.
- Packing devices.
- The market stall.
- Statistics of trade, prices, etc.

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* Fresh vegetables and fruits to be the subject of special temporary exhibitions. Models and pictures shown here.

† Under each class of gardening, all methods and tools to be shown, with statistics, etc.

162. Bedding Plants, Ornamental Bulbs, and their Uses.
163. Hardy Perennials, Shrubbery, Roses, etc.
Shade and ornamental trees.
Nurseries and the nursery trade.
164. The Window and Roof Garden. House Plants.
The Wardian case. Fern culture. House plants in general.
Window gardens.
165. The Lawn and its Care.
Special seeds and fertilizers.
Mowers and trimming tools.
166. The Pleasure Conservatory.
167. The Orchid House and Orchid Culture.
168. Cold Graperies, Grape Houses, Pineries, and other Recreative Fruit Propagating Houses.
169. Flower Markets.
Bouquets. The flower trade. The seed trade.

17. Forestry and Forest Products. The Wood-working Industries.

Note.—This classification is based upon that prepared by Dr. B. E. Fernow, Chief of the Division of Forestry, U. S. Department of Agriculture.

170. Forest Botany.
Distribution of forests, of genera, of species (maps).
Wood sections and herbarium specimens of the economically important timber trees. Seed collections—not herbarium—etc.
Illustrations of forest growth, typical trees, botanical features.
Anatomy and structure of woods. (Veneer sections and photo-micrographs.)
Peculiarities of forest growth—cypress-knees, burls, etc.
Diseases of forest trees and timber. Injurious insects.
171. Timber Culture.—Plant Material.
Conifers, seedlings and transplants.
Broad-leaved trees—seedlings, transplants of various sizes, cuttings

172. TIMBER CULTURE CULTIVATION—Continued.
Implements and machines used for planting.
Implements used in after-culture.
Means of protection against insects, animals, climate.
Seed beds and other graphic illustrations of nursery practice.

173. FOREST MANAGEMENT.
Maps, plans, illustrations, calculations illustrating forest management.
Instruments for measuring standing timber.
Growth of different ages and soils. Graphic or other illustrations showing rate of growth. Graphic or other illustrations showing influence of various management on tree growth.
Statistics of lumber trade and of forestry.
Exhibits showing relation of forests to climate.
Literature and educational means.

174. LUMBERING AND HARVESTING OF FOREST PRODUCTS.
The lumbering industry. Logging and transportation. Implements, machines, plans, drawings, and statistical material. Loggers' tools—stump-pulling devices, marking devices, measuring tools. Loading devices—sleds, flumes, slides, rope tramways, railroads, methods of water transportation, rafts, booms, etc.
The tan-bark industry. Other barks.
The turpentine industry.
The charcoal industry.

175. PREPARATION AND MANIPULATION OF LUMBER.
Dressing, shaping, and preparation of wood. Hewing of logs, spars, etc. Shaping of knees. Sawing and milling.
Drying and seasoning of wood.
Seasoning, kiln-drying, steam-bending, etc.
Preservation of wood by use of antiseptics, etc.
Saw-mills and saw-mill tools.
Wood-working machinery.
Wood-working tools and minor appliances.

176. FOREST PRODUCTS.—WOOD.
Wood for fuel.
Raw materials, unshaped and partly shaped.
Trees, round timber, masts, knees, hoop poles, telegraph poles, piles, posts, and all other material used as grown.
Saw logs, blocks and corded wood.
Shaped or otherwise prepared material.
Hewn timber, building timbers, railroad ties, etc.
Rived or split material—Coopers' stock, shingles, staves, etc.
Sawed lumber.
Rough—Boards, planks, etc.
Finished—Matched, molding, etc.
Veneers and fancy woods—Curly woods, bird's-eye, burls, etc.
Turned material.
Charcoal and by-products of its manufacture—Wood-vinegar, tar gas, etc.
Pulp manufacture, cellulose, etc.
Impregnated woods, various processes.

177. FOREST PRODUCTS OTHER THAN WOOD, AND THEIR DERIVATIVES.
Chemical and pharmacological substances.
Barks, galls, resinous substances for tanning, coloring, scenting, etc. Textile substances.
Naval stores, resin, gum, caoutchouc, gutta-percha, vegetable wax.
Potash in the raw state.

177. FOREST PRODUCTS OTHER THAN WOOD, AND THEIR DERIVATIVES—Continued.
Fruits, nuts, and edible plants or products of same.
Roots, herbs, lichens, mosses, fungi.
Other materials, obtained without cultivation.

178. THE WOOD-WORKING INDUSTRIES.
Carpentry, joining, and cabinet-making.
Sash, door and blind manufacture.
Wood-working auxiliary to carpentry. Machine-planing and polishing. Dovetailing, mortising, etc., by machinery. Turning. Manufacture of veneers. Wood stamping.
Wood carving, etc. Architectural carving. Carving of ornamental articles. Bowl and spoon making.
Marquettas and inlaying.
Wood engraving (see 58).
Furniture manufacture.
Parquetry, wood tapestry and fancy wood-work.
Toy manufacture.
Carriage, car, and wagon building.
Ship and boat building.—Cooperage products.
Wood-working machinery, tools.
Tool stocks, handles, mill-work.

179. THE MINOR WOOD-WORKING ARTS.
Manufacture of bent wood articles.
Bamboo and rattan splint wares, making "excelsior" chips, etc.
Wood composition and wood pulp (see 30).
Manufacture of chip hats, chip baskets, boxes, plates, wooden shoes (see 29).
Cork and substitutes for cork, as root of *Ochroma lagopus*, *Anona palustris*, *etc.* Materials and products.
Brier-root pipes. Root and knot carving.
Birch bark in various uses.
Piths and their uses.
Match manufacture. Toothpick manufacture.
Straw goods, willow ware, and basketry.

18. Domesticated Cattle—Stock Raising, Dairy Industries, etc.

180. PRINCIPLES AND ECONOMICS OF ANIMAL CULTURE.*
Illustrations of heredity and the variations of animals under domestication.
Charts showing methods of breeding, inbreeding and outcrossing, with results. Pedigrees of general interest.
Results of scientific experiment, by breeders, or by research stations, tending to the advancement of the animal-breeding industries, or to the improvement or better utilization of the product,—tabulated and arranged either in this class or by the side of the exhibit which they most fully illustrate.
The geographical distribution of the animal-breeding industries, the original source and present site of special breeds, and the principal centers of trade and lines of traffic, shown by maps and tables.
Prices of live stock, past and present, shown by tables and curves; similar exhibits of the aggregate and per capita values of live stock by districts and countries.
Breeding establishments, private and public:—maps, plans, statistics and literature.

* The details of the classification of the stock-raising industries are taken without material alteration, except a few additions, from the plan prepared by Col. G. E. Gordon, which he has permitted me to examine.

180. PRINCIPLES AND ECONOMICS OF ANIMAL CULTURE—Continued.

Animal pathology, surgery, and dentistry. History and literature. Methods and instruments. Research upon contagious disease, its origin and prevention. Sanitation and quarantine.

Feeding of animals. Results of experimental feeding and chemical and physiological research. Feed-standards and rations. Economy of feeding stuffs.

Illustrations of results of feeding for specific objects, as bone and muscle, meat, fat, milk and butter, wool, etc.*

181. THE HORSE AND ITS MANAGEMENT.

The breeds of the domesticated horse. History shown by models, maps, pictures.

Thorough-bred horses.

Standard-bred horses, and horses of record.

Light harness horses. Roadsters and trotters. Racing stock. Driving turnouts.

Coach horses. Coach turnouts.

Saddle horses, hackneys, hunters, cavalry horses. Combined riding and driving horses.

Educated and trick horses.

Ponies. Performing ponies, etc.

Draft horses.

Asses and mules.

Harness trappings and saddles. Carriages, wagons, etc., not elsewhere classed. Shoes and farriery. Grooming appliances.

182. CATTLE.

The breeds of domestic cattle. History shown by models, maps, pictures and literature.

Beef cattle. Breeding cattle. Registered breeding stock and fat cattle, registered and grade.

Dairy cattle. Registered breeding stock and cattle entered for comparative yield of product.

Cattle useful for general qualities.

Oxen. Oxen at work.

Crosses of domestic cattle with the buffalo.

Brands, ear-marks and stamps, tethers, bells, etc.

183. THE DAIRY INTEREST.

Geographical distribution of dairy farms, etc., in North America.

Farm products, butter, cheese, etc., with churns and other implements for the domestic dairy industry. Domestic creamery implements.

Fancy butter and cream for luxurious markets.

Milk supply of towns and cities.

Milk supply to evaporating factories.

Spring-houses and dairy-building generally.

For dairy products, see Class 189, and also in connection with food products in Division 5, where the methods and statistics of secondary handling, factories, etc., will be shown.

Dairying in foreign lands and among primitive people.

184. SHEEP AND GOATS.

The breeds of the sheep, goat, etc.

Sheep for mutton.

Fine-wooled sheep.

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* Use of animals for food shown in detail in Class 43. An educational exhibit of same might well be repeated here with such other applications of the results, primary or secondary, of the animal industries as is of value to the breeder.

184. SHEEP AND GOATS—Continued.
Middle-wooled sheep.
Long-wooled sheep.
Sheep and goats for dairy use.
Miscellaneous dairy animals.
Miscellaneous fiber-producing animals.
Sheep pastures, washing and smearing, shearing, and care of fleeces.

185. SWINE.
The breeds of swine. Fat swine.
Domestic products of the hog.

185–A. OTHER DOMESTICATED ANIMALS.
Camels and elephants, llama, vicugna, alpaca, guanaco, yaks, etc.

186. POULTRY, PIGEONS, ETC.
The breeds of poultry and pigeons, and all domesticated birds. Poultry shows. Standards of perfection. Literature.
Fowls and capons.
Ducks and geese. Swans.
Turkeys.
Pigeons and pigeon-lofts. Homing pigeons.
Guinea fowls, peafowls, ostriches, etc.
Pheasants and other ornamental birds. Pet birds in general Cages.
Poultry and bird houses and their fittings. Incubators.
Artificial stuffing, caponizing, *paté de foie gras*.
The market for poultry, eggs, feathers, down, quills, and all products. Methods of packing and transportation. Prices. Statistics, etc.

187. DOGS.
All races and breeds of dogs. Ancestry of the dog. Bench shows. Breeding kennels, registers, standards and literature.
Sporting dogs. Field trials.
Watch-dogs and pet dogs.
Dogs used as burden bearers.

188. RABBITS, CATS, FERRETS, ETC.

189. PRODUCTS OF THE STOCK-RAISING INDUSTRIES.
Results of all scientific experiment by stock-breeders or stations tending to the advancement of the animal-breeding industries or to the improvement or better utilization of the product, tabulated in the most effective manner—and arranged here, or by the side of the individual exhibits.
Meats—Fresh, salted, dried, smoked, the products of farm industry. Implements and methods of preparation. Butchers' tools and methods. Abattoirs.
Dairy products—Milk, cream, butter and cheese. Implements and methods of preparation.
Oils and fats—Lards, tallows, butterines, etc. Implements and methods of preparation on the farm.
Hides and skins of farm animals as prepared on the farm, salted or rough-tanned, with examples of factory-tanned hides, so far as necessary for study.
Fleece and wools, washed and unwashed, as they leave the farm. (With such illustrative matter in the way of results of experiment and manufactured products as may be necessary for the proper understanding of the methods and results of scientific sheep-breeding.)
Hairs of all kinds produced on the farm, or stock establishment:—horse, goat, cow, cashmere, angora goat, etc.
Waste products of the farm. Hoofs, bones, etc. Implements and methods of preparation.

189. PRODUCTS OF THE STOCK-RAISING INDUSTRIES—Continued.
Cold storage, refrigeration and transportation of farm products by farmers. Appliances, methods, and statistics.
Markets. History. Prices, commissions, freight charges, etc., from the standpoint of the farmer.

19. The Minor Animal Industries.

190. WILD-PRODUCT GATHERING.
Primitive hunting, etc.
Gathering of animal products, obtained without culture, and not elsewhere classed.
191. BEES AND BEE CULTURE.
Natural history of bees. Geographical distribution of the bee industry.
Hives and housing. Feeding and care. Protective devices.
Honey and wax. Gathering, preparing, packing and uses.
Commerce in the products of apiculture. Literature and statistics.
192. SILK CULTURE AND SILK REELING.
Natural history and geographical distribution of the silk-worm and related forms used as substitutes. Larva, pupa and imago of each species.
Cocoons and silk of each from the industrial standpoint, with tests of strength, etc.
Methods of caring for the eggs, feeding of larvæ, care and gathering of cocoons. Food plants and prepared food. Implements and processes.
Cocoon stifling.
Implements and methods of filature. Pictures of reeling establishments.
Markets and prices.
History, statistics and literature.
193. THE COCHINEAL INDUSTRY.
Care of the cochineal bugs.
Gathering and primary preparation of cochineal.
194. THE LEECH AND MAGGOT TRADES AND OTHER UTILIZATION OF INVERTEBRATE ANIMALS NOT ELSEWHERE CLASSED.
Leech gathering—Leech culture, methods and statistics of trade.
Maggot culture for bait and pet-bird food.
195. THE WILD BIRD'S EGG AND DOWN INDUSTRY.
Monographic exhibit. Literature and statistics.
196. THE IVORY TRADE.
The elephant hunt and ivory traffic of Africa.
Fossil ivory in the far North.
197. THE FUR TRADE. HUNTING AND TRAPPING FOR PROFIT.
Trappers' methods and implements. Hunters' methods.
Peltries, hair, feathers, down, horns, teeth, bones, musks, castoreum and similar products, and other results.
History, literature and statistics.
198. THE WILD ANIMAL AND MENAGERIE-SUPPLY TRADE.
Literature and statistics.
Methods of administration in menageries and zoölogical gardens.
199. PROTECTION OF WILD ANIMALS AND GAME. GAME LAWS. PRESERVES.

DEPARTMENT 2.—THE MINES AND METALLURGY.

20. Economic Geology and Mineralogy, and the History of Mines, Etc.

201. GEOGRAPHICAL DISTRIBUTION OF MINERAL DEPOSITS.
Maps, relief-models, and pictures to illustrate the resources of countries and regions, the location of mines and mineral localities; to illustrate specific mines and deposits.
Treatises on general resources of regions, and on special mines and deposits.

202. FORM OF MINERAL DEPOSITS. MINERAL STRATIGRAPHY.
Sections—graphic and stereographic—to illustrate veins, their location and character. Strata and beds, oils and gas layers, water layers.
Pictures of mines, quarries, and workings.

203. CHARACTER OF MINERAL DEPOSITS. ECONOMIC MINERALOGY.
Collections of minerals arranged topographically—to illustrate the resources of regions; to illustrate the character of special deposits; arranged systematically; to show the present state of knowledge; for comparative study of local resources.
Analyses of special deposits.

204. ROCK DEPOSITS, ETC. DISTRIBUTION, FORM AND CHARACTER.
Quarries, beds, etc., illustrated by maps, sections, pictures and literature.
Collections of rocks, arranged stratigraphically, to illustrate location of deposits; arranged by regions; arranged systematically; arranged to show possibilities of application.
Collections of other non-metallic mineral substances.

205. METALLURGICAL CHEMISTRY AND PHYSICS.
Methods and results to be shown from standpoint of direct value to the industrial arts.
Historical exhibit to show the importance of these sciences to the arts of mining and metallurgy.

206. PETROGRAPHY AND ITS ECONOMIC APPLICATION.
Methods and results, as in Class 205.
Microscopic structure of rocks, shown by slides, etc.
Tests of strength and resistance power of building stones, with machinery.
Tests of durability, weathering, etc., with examples.

207. HISTORY OF MINES AND MINING.
Prehistoric mining in Europe and America.
Early commerce in metals.
Specimens of primitive tools and products.
History and relics of special mining enterprises, and their relation to the history of civilization, *e. g.*, the gold mines of California, the diamond mines of Africa, etc.
Retrospective exhibits of all kinds.
Literature and statistics.

208. MINING COMMERCE.
Markets and centers of consumption, past and present.
Storage methods. Piling coal, etc.
Prices, past and present. Duties, etc.
Transportation routes and methods. Export and import.
Petroleum, pipe-lines, etc.

209. MINING SANITATION AND LIFE-SAVING METHODS.
(See also Class 865.)

21. Mine Engineering. (Illustrated by Models, Maps and Sections.)

210. HISTORY OF MINING METHODS.
Retrospective exhibits. Plans of abandoned mines. Ancient methods. Early literature of the art. Pictures and models.

211. PROSPECTING AND PLOTTING OF MINES.
Surface surveying and maps. Nature and extent of deposits.
Underground surveys and projection of work, location of shafts, tunnels, etc.
Surveys for aqueducts and drainage.

212. MINING SHAFTS AND TUNNELS.
Sinking and lining of shafts, wells, adits, tunnels, levels, aqueducts, timbering, lagging, etc.
Cutting stalls, headings, etc.
Opening, stopping and breaking down ore.
Hoisting and delivery of ore. Raising and lowering miners.

213. DRAINAGE, VENTILATION AND LIGHTING OF MINES.
Drainage by pumps, pumping engines, buckets or adits.
Ventilation—Methods and apparatus.
Lighting—Lamps, safety lamps.
Signals. Parachutes. Safety apparatus.

214. SUBAQUEOUS MINING, BLASTING, ETC.
Methods, apparatus and history.

215. QUARRY ENGINEERING.

216. OIL WELLS: MACHINERY AND MANAGEMENT.
(See Class 153.)

217. NATURAL GAS: MACHINERY AND MANAGEMENT.
(See Class 154.)

218. INSTRUMENTS OF PRECISION USED IN MINE ENGINEERING.

219. MODELS AND PLANS OF REPRESENTATIVE MINES.

22. Mining and Metallurgical Tools and Machinery.

220. ANCIENT TOOLS FOR MINING, QUARRYING AND SMELTING.
Retrospective exhibits, literature, etc.

221. MINERS' TOOLS.
Hammers and mauls, picks, chisels, crowbars, wedges, drills.
Other tools and articles of personal equipment. Sieves, shovels, scoops and barrows.

222. DRILLING AND BORING MACHINES FOR USE IN ROCK AND EARTH.
Machinery of shaft and well-cutting.

223. MACHINES AND APPARATUS FOR COAL CUTTING, ETC.

224. EXCAVATING AND DREDGING MACHINES.
Steam scoops and shovels. Steam dredge scoops, suction excavators, etc.
Machinery for hydraulic and placer mining.

225. HOISTING MACHINERY FOR MINES.
Hoisting appliances for miners or product.
Machinery used in pumping, draining and ventilation.

226. BLASTING AND EXPLOSIVES.
Retrospective exhibit. History of blasting. Literature.
Explosives of all kinds (exhibit to be by model or empty package).
Fuses and accessories of blasting.

227. CRUSHING AND SORTING MACHINERY, ETC., FOR ORES AND ROCKS.
Crushing, grinding, sorting and dressing machines. Breakers, stamping mills, sieves, screens, jigs, concentrators.

auriferous pyrite in quartz by stamping and amalgamating.

Extraction of gold from auriferous mispickle (arsenical pyrites) by roasting and chlorination.

Extraction of gold and copper from auriferous copper ores by the fusion and electrolytic process.

The manufacture of gold leaf.

232. SILVER MINING.

Extraction of silver from base ores by chlorodizing, roasting, and milling (amalgamation).

Smelting of argentiferous lead ores and the refining of the base bullion (silver and lead).

The refining of base bullion (silver and lead).

233. IRON AND STEEL.

Monographic exhibit.

234. COPPER.

Native copper, sulphide ores, oxidized ores.

Smelting and refining of copper by the fusion process.

Refining of pig copper.

Rolling of copper.

235. DIAMONDS AND PRECIOUS STONES IN GENERAL.

236. LEAD, QUICKSILVER, ANTIMONY, TIN, NICKEL, ARSENIC, BISMUTH, CADMIUM AND COBALT, ETC.

237. ZINC.

238. BARITES, FELDSPAR, ETC.

239. OTHER INDUSTRIES.

24. Quarrying and Stone Working.

240. HISTORY OF THE USE OF STONE.

Early quarries and stone masonry. Literature. Folk-lore.

241. HISTORY AND STATISTICS OF QUARRIES AND BUILDING STONE.

Prices, past and present. Markets and traffic.

Comparative use of stone and other materials, past and present, and in vari

246. BUILDING STONE, MARBLES, SLATES, ETC.—Continued.
Stone ready for use for building-decoration, statuary, monuments and furniture, in blocks or slabs, not manufactured.
247. STONE WORKING. METHODS AND PRODUCTS.
Stone breaking, crushing, and pulverizing.
Stone-dresser's art.
Carver's and sculptor's art. (From mechanical side.)
Lapidary's and gem-cutter's art.
248. MASONRY. (See also Construction.)
Stone and brick laying in mortar, etc.
Stuccoing and plaster molding.
Construction of concrete and other roads and pavements.
249. MOSAICS AND ORNAMENTAL STONEWORK.
(See DEPARTMENT 7.)

25. Coal, Petroleum, and Gas. A Comprehensive Monographic Exhibit.

250. HISTORICAL EXHIBIT OF MINERAL COMBUSTIBLES AND THEIR USES.
251. CHEMISTRY AND GEOLOGY OF COAL, ETC.
252. THE COAL MINES.
253. THE PETROLEUM REGION.
History of petroleum.
Methods of exploitation.
Transportation and consumption.
254. NATURAL GAS.
A monographic display.
255. ILLUMINATING GAS AND ITS MANUFACTURE.
256. BITUMENS AND ASPHALTUMS. TARS.
257. PEAT, ETC.
258. THE APPLICATIONS OF COAL, PETROLEUM, ETC.—A MONOGRAPHIC DISPLAY.
The objects to be shown here for a special purpose in limited number will, of course, be shown elsewhere in their customary relationships.
259. COMMERCE IN COAL, PETROLEUM, AND THEIR DERIVATIVES.
Historical and statistical data showing relations of coal and petroleum to all the arts of civilization.
Prices. Routes of traffic, etc.

26. Exploitation of Water and Ice and other Surface Deposits.

261. WATER SUPPLY.
Springs and fountains. Utilization. Retrospective exhibits.
Cisterns and storage tanks. Other receptacles.
Artesian wells. Pumps. Well apparatus.
Water supply (independent of engineering and sanitary considerations).
Dams, aqueducts, sluices.
262. THE ICE INDUSTRY.
Harvesting ice. Tools and methods. Pictures.
Ice storage. Ice supply. Methods and statistics.
Ice manufacture, refrigerators, cold storage, etc., may possibly be conveniently shown in this connection.
263. MINERAL WATERS.
Geographical distribution. Chemistry.
Sources. Exhibits of special springs, with pictures, etc.
Methods of bottling, etc. Transportation, prices, markets.
264. THE SALT INDUSTRIES.
Salt springs and evaporating works.

270. PRECIOUS METALS.
Examples in various stages, not shown elsewhere

271. IRON AND STEEL.
In the pig, ingot and bar.
Plates and sheets.
Specimens of slags, fluxes, residues, and products of working.
Edge tools.

272. COPPER.
In ingots, bars and rolls.
Specimens showing stages of production.

273. LEAD, ZINC, ANTIMONY, ALUMINUM, ETC., THE RESULT OF EXTRACTIVE PROCESSES.
Illustrations of manufacture and products.

274. ALLOYS USED AS MATERIALS.
Statuary, bronze, gun, bell and speculum metal.
Brass, and alloys used as a substitute for it.
White alloys, as Britannia metal, German silver, pewter, etc.
Type metal, sheathing metals, and other alloys.
Babbitt or anti-friction metals.

275.

276. PRODUCTS OF THE WORKING OF CRUDE METALS.
Castings, bells, etc.
Commercial iron. Special kinds of iron. Architectural iron and railroad iron, etc. Plates for sheeting and construction.
Sheet iron and tin. Sheet iron coated with zinc or lead.
Copper, lead and zinc sheets, etc.

277. WROUGHT MATERIALS.
Forge work.
Wheels and tires.
Chains.
Unwelded pipe.

28. Products of Mines not Elsewhere Placed.

281. CEMENTS, LIME, ETC.
Lime, cement and hydraulic cement, raw and burned, accompanied by specimens of the crude rock or material used, etc.
Specimens of lime-mortar and mixtures, with illustrations of the processes of mixing, etc.; hydraulic and other cements.

282. ARTIFICIAL STONE, ETC.
Beton mixtures and results, with illustrations of the processes.
Artificial stone for building purposes, building blocks, cornices, etc.
Artificial stone mixtures for pavements, walls or ceilings.

283. CLAYS, ETC.
Clays, kaolin, silex, and other materials for the manufacture of porcelain faience, and of glass, bricks, terra cotta and tiles, and fire brick; refractory stones for lining furniture, sandstone, steatite, etc., and refractory furnace materials, bricks, and tiles.

284. GRAPHITE, ETC.
Graphite—crude and refined—for polishing purposes, for lubricating, electrotyping, photography, pencils, etc.

285. POLISHING AND ABRADING MATERIALS.
Hones, whetstones, grindstones; grinding and polishing materials; sand quartz, garnet, crude topaz, diamond, corundum, emery, in the rock and pulverized, and in assorted sizes and grades.
Sandpaper and its manufacture.

286. BRINES AND ALKALIES.
Natural brines, saline and alkaline efflorescences and solutions.

287. MINERAL FERTILIZERS.
Mineral fertilizing substances, gypsum, phosphate of lime, marls, shells, coprolites, etc., not manufactured.

288. MINERAL COMBUSTIBLES.
Coal, anthracite, semi-bituminous and bituminous; coke, coal waste, and pressed coal; albertite, asphalt, and asphaltic limestone; bitumen, mineral tar, crude petroleum. (See also Class 117.)

289. ASBESTOS AND ITS APPLICATIONS.

29. Miners, Quarrymen, and Operatives.

291. NUMERICAL STATISTICS. NATIONALITY, ETC.
292. SOCIAL STATISTICS—PHYSICAL CONDITION.
293. INTELLECTUAL AND MORAL CONDITION.
294. CUSTOMS, DIALECTS.
295. FOOD.
296. CLOTHING AND PERSONAL EQUIPMENT.
297. HABITATIONS.
298. MINERS' SOCIETIES.
299. MINING TOWNS.
Mining towns in America and other countries. Pictures, maps. Special local exhibits.

DEPARTMENT 3.—MARINE AND FISHERIES.

30. The Sea and Inland Waters. Physical Conditions. Aquatic Life.

300. THE SEA AND ITS PHYSICAL CONDITIONS. (THALASSOGRAPHY.)
Oceanic basins. Coast lines. Depths and soundings. Temperatures. Currents. Salinity. Pressure. Light.
Characteristic deep-sea deposits. Character of the bottom. Characteristic plant and animal life of the great depths.

Brooks and creeks.

302. Marine Meteorology.
Winds and storms. Tornadoes. Fogs.
Storm charts and warnings at sea.

303. The Science of Navigation.
Charts of all kinds. Routes of travel.
Instruments and methods of observation.
Signal codes.
Obstructions to navigation. (Ice, derelicts, etc.)

304. Voyages and Explorations.
Literature and history of voyages.
Voyages of circumnavigation, deep-sea exploration, etc.
Arctic and antarctic voyages.

305. Marine and Aquatic Research.
Institutions and organizations. Fish commissions.
Literature.
Apparatus.
Methods and instruments.

306. Light-houses.
History and literature.
Methods of construction.
Distribution, maps, etc.

307. Light-ships.

308. Aquatic Life: Scientific Collections and Literature.
Works on aquatic zoölogy and botany. Maps illustrating geographical distribution, migration, etc., of fishes and other aquatic animals.
Specimens and representations illustrative of the relations between extinct and existing forms of life.
Specimens (marine and fresh water), fresh, stuffed, or preserved, in alcohol or otherwise, casts, drawings, and representations of.
Algæ, genera and species, with localities.
Sponges, corals, polyps, jellyfish, etc.
Entozoa and Epizoa.

31. Seaports and Harbors. Ocean Commerce. River Commerce.

310. HISTORY OF WATER COMMERCE.
Retrospective collections. Seaports and fishing ports of old times. Maps, views and literature.

311. MODERN SEAPORTS AND FISHING TOWNS.
Maps and views. Statistical statements.
Systems of marine insurance. Systems of salvage. Wrecking systems.
Maps showing relationships and commercial connections.

312. OCEAN COMMERCE.
Routes of traffic. History and statistics.
History and statistics of trading companies.
Foreign trade and coasting trade. Tonnage statistics.

313. RIVER AND HARBOR COMMERCE.
Maps and charts.
History and statistics by rivers and by countries. Ferry systems.

314. LAKE COMMERCE.
Treatment as above.

315. CANAL SYSTEMS.
History and literature.
Maps and systems.
Methods and appliances. Locks and towpaths.

316. FERRIES.
Treatment as above.

317. HARBOR PROTECTION AND REGULATION.
Breakwaters.
Other appliances for breaking the force of the sea at the entrance of harbors.
Harbor lights and signals. Beacons, bells and whistles.
Buoys and buoy systems.
Harbor police. Police boats. Quarantine.

318. PIERS, SLIPS AND DRY DOCKS.
Wharves of all kinds.
Floating docks and landings.
Dry docks. Graving docks.
Marine railways.

319. PILOT SYSTEMS.
History and literature.
Systems of organization. Pilot boats and signals.
Fees and financial methods.

32. Mariners and Fishermen. Outfitters and Capitalists.

320. THE FOLK-LORE OF MARINERS, ETC.
Literature of sea-faring life, etc.
Dialects as shown in books, songs, etc.
Tales and traditions of the sea.

321. SHORE LIFE OF MARINERS.
Houses and boarding houses. Places of amusement.
Churches and bethels.
Seamens' homes and retreats. Hospitals.
Shops and outfitting establishments.

322. SEA LIFE OF MARINERS.
Interior views and plans.
Sleeping accommodations, bunks and hammocks.
Rations. Galley and its outfit.
Handicraft. Ropework. Scrimshandy. Tattooing.
Amusements.

323. COSTUME AND PERSONAL EQUIPMENT OF MARINERS, ETC.
Clothing of sailors and fishermen of all nations.
Waterproof garments, etc.
Personal equipment, knives, etc.
Clothing of fisherwomen and fish-women of all nations.
324. ECONOMICAL CONDITION OF MARINERS AND FISHERMEN.
Wages and profits.
Insurance systems. Benefit societies.
325. STEAMBOATMEN. ECONOMIC CONDITION, ETC.
326. POPULATION OF SEAPORT TOWNS. ECONOMIC CONDITION, ETC.
327. CAPITAL AND ITS EMPLOYMENT IN MARINE AFFAIRS.
328. MARINE INSURANCE SYSTEMS. UNDERWRITERS.
History and literature.
329.

33. Boats and Sailing Vessels.

330. SHIP BUILDING AND BOAT BUILDING.
History, literature and statistics.
Pictures of shipyards and of vessels on the stocks.
The evolution of the ship, of rigging, and of hull, shown by progressive series of building models.
Methods of designing and projection.
Lines of representative ships.
Tools of shipbuilding. Materials and their sources.
Timber and forms.
Shipbuilder's hardware.
Riggers' lofts and methods of rigging. Riggers' tools. Ropes and canvas.
Ways and launchings.
Boat building.
331. SHIP RIGGING, CANVAS AND CORDAGE.
Spars and masts, and all accessories.
Sails and sail-making. Tools and methods.
Canvas for sails and other marine uses. Sails, awnings, etc.
Cordage of all kinds for marine use.
Riggers and sail-makers. Lofts, etc.
332. SHIP CHANDLERY AND BOAT FITTINGS.
Hardware of all kinds for use on vessels and boats. Blocks and cleats, rowlocks.
Anchors, killicks and drags.
Steering gear of all kinds.
Oars, sweeps and boat-hooks.
Ship tools. Carpenters' tools. Boatswains' tools.
Other fittings.
(For ship's instruments, see Class 358.)
333. SQUARE-RIGGED VESSELS.
Models and pictures.
Builders' models and lines.
Evolution of hull and rigging.
334. FORE AND AFT RIGGED VESSELS.
Models, pictures, etc., as in previous class.
The American schooner: Monographic exhibit.
The English cutter: Monographic exhibit.
Fishing vessels, pleasure yachts, etc.
Pilot boats (see also Class 319).
335. SEAGOING VESSELS OF FOREIGN TYPES.
Junks, etc.

336. SAILBOATS OF ALL KINDS AND NATIONS.
Catboats, etc.
Sloop-rigged sailboats.
Schooner-rigged sailboats.
Cutter-rigged sailboats.
Sailboats of other rigs.
Flying proas, etc.
Ice boats.

337. CANOES AND ROWBOATS.
Coracles and curraghs. Skin boats, as the Eskimo kyak and umiak. Bark canoes. Dugouts. Punts and scows for poling. Modern canoes for cruising and fishing. Other types.
Dories and sharpies, etc. Sneak-boxes, etc. Yawls, dingies, etc. Whitehall boats and others of similar construction. Whale-boats, seine-boats, etc. Racing shells and barges. Other types.

338. SCOWS AND LIGHTERS. CANAL BOATS.
Coal barges. Dredging scows. Boats for carrying telegraph cable or railroad trains.
"Camels."

339. BOATS FOR SPECIAL PURPOSES.
Water boats, fire floats, bathing boats, house boats, screw and floating docks, police boats, portable boats, canvas boats, folding boats, rafts, catamarans, balsas, used for navigation or life-saving.
Life boats.

34. Steamships and Steamboats.

340. HISTORICAL AND RETROSPECTIVE EXHIBIT.
Drawings and models. Relics of the work of Rumsey, Fitch, Fulton, Stevens and other pioneers.

341. OCEAN STEAMSHIPS AND COAST STEAMERS.
Paddle-wheel and screw-propeller.

342. STEAMBOATS.
River, lake and sound steamboats.
Paddle-wheel and screw-propeller and stern-wheel.

343. ARMORED CRUISERS, TORPEDO BOATS AND APPLIANCES.

344. LAUNCHES, TENDERS, ETC.
Boats burning coal, napthaline and petroleum. Electric boats.

345. STEAM LIGHTERS AND FLOATING ELEVATORS.
Car floats, barges, etc.

346. THE STEAM PLEASURE YACHT.
Monographic exhibit.

347. ENGINES AND MACHINERY.
Single, double and triple expansion boilers.
Coal handling and stoking appliances.
Steam and steam-steering appliances.
Devices for hoisting sail and handling cargo. Winches and ships' pumps.

348. SHIP INSTRUMENTS AND FURNISHINGS.
Compasses, barometers, telescopes, quadrants, and sextants, trumpets, fog horns, lamps and lanterns. Electric search lights, luminous paints, logs, and log-lines, lead and lead-lines. Log-books and ship stationery.

349. STEAMER'S COMMISSARY.
Cabins and state rooms. Cabin and deck furniture. Emigrant bunks. Culinary and eating arrangements. Store-rooms and refrigerating appliances.

352. FISH HOOKS, JIGS AND DRAILS.
353. FISHING LINES AND RIGGED GEAR.
354. FISHING RODS AND REELS FOR LINES AND NETS.
355. NETS AND SEINES, RAKES AND DREDGES, AND MATERIALS USED IN THEIR MANUFACTURE.
356. FISH TRAPS, WEIRS AND POUNDS.
357. FISHING STATIONS AND THEIR OUTFIT.
358. KNIVES, GAFFS AND OTHER APPARATUS.
359. ILLUSTRATIONS OF SPECIAL FISHERIES.
    The whale and seal, cod, mackerel, halibut, herring, haddock, pollock, menhaden, swordfish, bluefish, oyster, sponge, and other sea fisheries.

36. Fresh-Water Fishing and Angling.

361. HISTORY AND LITERATURE OF ANGLING.
    Waltonian literature.
    Folk-lore. Anglers' trophies.
362. SALMON NETS AND FIXED APPLIANCES FOR CATCHING SALMONIDÆ IN ALL THEIR VARIETIES.
363. SALMON RODS, REELS, LINES, ARTIFICIAL FLIES AND BAITS, GAFFS, SPEARS, CREELS, ETC.
364. BASS, PIKE, PERCH RODS, REELS AND TACKLE, ARTIFICIAL SPINNING BAITS, ETC.
365. TRAPS, NETS, BUCKS, WHEELS, AND ALL KINDS OF APPARATUS FOR CATCHING EELS, LAMPREYS, ETC.
366. ANGLERS' APPAREL OF EVERY DESCRIPTION.
367. THE ANGLERS' CAMP AND ITS OUTFIT.
368. ILLUSTRATIONS OF SPECIAL FRESH-WATER FISHERY.
    Shad and alewife, sturgeon, eel, salmon, whitefish, and Great Lake fisheries, etc.

37. Products of the Fisheries and their Manipulation.

A. Preparation, Preservation and Utilization of Fishery Products.

b. For other than edible purposes.

375. OILS, MANURES, AND OTHER PRODUCTS PREPARED FROM FISH.
376. METHODS OF AND MODELS AND OTHER REPRESENTATIONS OF APPLIANCES FOR PREPARING OIL AND MANURES FROM FISH.
377. SEA AND FRESH-WATER PEARL SHELLS; MOTHER-OF-PEARL MANUFACTURED; PEARLS SORTED.
378. PREPARATION AND APPLICATION OF SPONGES, CORALS, PEARLS, SHELLS, AND ALL PARTS AND PRODUCTS OF AQUATIC ANIMALS, ETC., TO PURPOSES USEFUL AND ORNAMENTAL, WITH SPECIMENS.

B. Transport and Sale of Fish.

379. APPLIANCES FOR CARRYING FISH, AND FOR PRESERVING FISH DURING TRANSPORT OR OTHERWISE, AND MODELS OF THE SAME. MODELS OF FISH MARKETS AND APPLIANCES CONNECTED WITH THE SAME.

38. Fish Culture.

380. THE HISTORY OF FISH CULTURE.
381. HATCHING, BREEDING AND REARING ESTABLISHMENTS, INCLUDING OYSTER AND OTHER SHELL-FISH GROUNDS.
382. APPARATUS AND IMPLEMENTS CONNECTED WITH FISH CULTURE AND FOR TRANSPORTING FISH AND FISH OVA. FOOD FOR FRY.
383. REPRESENTATIONS ILLUSTRATIVE OF THE DEVELOPMENT AND PROGRESSIVE GROWTH OF FISH.
384. MODELS AND DRAWINGS OF FISH WAYS AND FISH LADDERS.
385. DISEASES OF FISH, WITH SPECIAL REFERENCE TO THEIR ORIGIN AND CURE. MODELS AND DRAWINGS.
386. PROCESSES FOR RENDERING STREAMS POLLUTED BY SEWAGE AND CHEMICAL OR OTHER WORKS INNOCUOUS TO FISH LIFE. (Illustrated by models and drawings.)
387. PHYSICO-CHEMICAL INVESTIGATION INTO THOSE QUALITIES OF SALT AND FRESH WATER WHICH AFFECT AQUATIC ANIMALS; INVESTIGATION OF THE BOTTOM OF THE SEA AND OF LAKES, SHOWN BY SAMPLES; AQUATIC PLANTS IN RELATION TO FISHING, ETC.; RESEARCHES INTO THE AQUATICA FAUNA (animals of the several classes, preserved in alcohol or prepared, etc.); APPARATUS AND IMPLEMENTS USED IN SUCH RESEARCHES.
388. ACCLIMATIZATION OF FISH. MARKING OF INTRODUCED FISH FOR PURPOSES OF IDENTIFICATION.
389. STATISTICS OF THE RESULTS OF FISH CULTURE.
Specimens of fish artificially propagated or introduced.

39. Aquatic Life-Saving Systems. Swimming and Diving.

391. DIVING APPARATUS.
Apparatus for diving and swimming practically exhibited.
392. LIFE PRESERVERS, SWIMMING BELTS, ETC.
393. APPLIANCES OF MARITIME LIFE-SAVING SERVICE.
394. MORTARS FOR CASTING LINES.
395. LIFE BOATS, ETC.
396. APPARATUS TO PREVENT COLLISION AT SEA.
397. DISTRESS SIGNALS.
398. THE RESUSCITATION OF THE APPARENTLY DROWNED.
399. DIVING MACHINERY, DIVING BELLS, NAUTILUSES, DIVING ARMOR, ETC. SUBMARINE BOATS.

DEPARTMENT 4.—MANUFACTURES AND OTHER ELABORATIVE INDUSTRIES.*

40. Machinery and Motors.

401. MOTORS AND APPARATUS FOR THE GENERATION AND TRANSMISSION OF POWER.
Early history of motors and power.
Boilers and all steam and gas generating apparatus for motive purposes. Appliances for removal of boiler incrustation.
Water-wheels, turbines, water engines, hydraulic rams, water-pressure engines, wind mills. Utilization of tide forces.
Steam, air and gas engines, stationary and portable.
Apparatus for the transmission of power—shafting, belting, gear-wheels, cables, etc.
Screw propellers, wheels for the propulsion of vessels, and other motors of similar nature. (See also Class 347.)
Implements and apparatus used in connection with motors: Steam gauges, dynamometers, pressure gauges, etc.
Lifting appliances and cranes, hoists, screw jacks, etc.
Electric motors. (See Division 42.)
Hydraulic motors and hydraulic lifts. (See Class 412.)

402. HYDRAULIC AND PNEUMATIC APPARATUS, AERONAUTICS AND LIFTING. (See also Class 261.)
Pumps and apparatus for lifting and moving liquids. Tympanums, hydraulic rams, etc.
Stop valves, cocks, pipes, etc.
Pumps and apparatus for moving or compressing air or gas or vapors.
Pumps and blowing engines, blowers, and ventilating apparatus.
Hydraulic jacks, presses, elevators, lifts, cranes, and all appliances for moving heavy weights.
Fire engines—hand, steam or chemical—and fire-extinguishing apparatus, hose, etc. (See also Class 865.)
Soda-water machines, bottling apparatus, corking machines, beer engines. (See also Classes 557 and 559.)
Diving apparatus and machinery. (See Class 391.)
Aeronautics. A monographic display. †

Books, MSS., photographs, drawings and models relating to aeronautics.
Raw materials used in the construction of balloons, such as silk, cotton, rope, nets, cane, etc.
Gas balloons, captive or steering, montgolfiers, and separate parts used in the construction or working of balloons.
Parachutes, kites and mechanical birds.
Instruments for use in aeronautic meteorology, such as barometers, thermometers, hygrometers, registering appliances and photographic apparatus.
Apparatus for making pure hydrogen, carbureted hydrogen, and carbureted air.
Light motors, gas and petroleum engines.
Electrical apparatus, susceptible of being utilized in aeronautics, such as motors, telegraphs, telephones and electric lamps.
Appliances for aerial correspondence by optical telegraphy or by carrier pigeons.

403. MACHINERY AND APPARATUS OF MINING, METALLURGY, CHEMISTRY, ETC. (See also Department 2.)
Rock-drilling machinery. Well and shaft boring. Apparatus for artesian wells and water supply in general. Quarrying, etc.

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* Stone-working industries, see Division 29. Wood-working industries, see Division 17.

† Classification that of the Aeronautical Exhibition, Paris, 1883.

403. MACHINERY AND APPARATUS OF MINING, METALLURGY, CHEMISTRY, ETC.—Continued.

Hoisting, and machinery accessories, pumping, draining, and ventilating, for mines.

Crushing, grinding, sorting and dressing. Breakers, stamps, mills, pans, screens, sieves, jigs, concentrators, compressors.

Furnaces, smelting apparatus, and accessories.

Machinery used in Bessemer process.

Chemical manufacturing machinery. Electroplating. (See Class 428.)

Gas machinery and apparatus. Natural-gas appliances.

404. MACHINES AND TOOLS FOR WORKING METAL, WOOD AND STONE. (See also Department 2 and Division 46.)

Machines and tools used by carpenters. Planing, sawing, veneering, grooving, mortising, tonguing, cutting, molding, stamping, carving, cutting veneers, and cask-making machines, etc. Cork-cutting machines, scroll-saws; direct-acting steam sawing machines, with gang saws.

Machines for cutting moldings, borders for frames, floor squares, furniture, etc. Turning lathes and different apparatus of joiners and cabinet makers. Machines for sharpening saws.

Rolling mills, bloom squeezers, blowing fans.

Furnaces and apparatus for casting metals, with specimens of work.

Steel, trip and other hammers, with specimens of work. Anvils, forges.

Planing, drilling, slotting, turning, shaping, punching, stamping, slotting and screw-cutting machines. Lathes. Wheel cutting and dividing machines, emery machines, drills, caps, gauges, dies, etc. Coining presses. File-cutting machines. Engineers' machine tools. Boiler-makers' tools, punching, riveting, drilling, plate-planing and welding machinery, etc. Nail and rivet making machines.

Stone sawing and planing machines, dressing, shaping, and polishing, sand blast, glass-grinding machines, etc. Coal-cutting machines.

Brick, pottery and tile machines. Machines for making artificial stone.

Furnaces, molds, blowpipes, etc., for making glass and glassware.

405. MACHINES AND IMPLEMENTS OF SPINNING, WEAVING AND FELTING. (See also Division 39.)

Appliances used in preparatory operations: Fiber-extracting machines, upright looms, and methods of spooling. Accessory apparatus. Machines for fulling, calendering, embossing, watering, measuring, folding, etc.

Appliances for hand-spinning separate pieces pertaining to the appliances of spinning mills. Machines and apparatus used in the preparation and spinning of textile substances. Apparatus and methods used in the operations complementary to these, drawing, winding, twisting, and throwing; mechanical finishing. Apparatus for drying and determining the thickness and numbering the threads.

Appliances of ropewalks, round cables, flat cables, tapering cables, ropes, twine, wire cable, cables with metal core, fuse, quick matches, etc.

Machines and looms for the manufacture of plain fabrics, of silks, figured and embroidered stuffs.

Machines for the manufacture and printing of cotton and linen goods.

Machines for the manufacture of woolen goods and mixed fabrics.

Looms for manufacturing carpets and tapestry. Looms and machines for the manufacture of hosiery and net. Appliances for lace making. Appliances for making trimmings. Rug-making machinery. Mat-making machines.

Machines for the manufacture and printing of felting.

Machines for the manufacture of India-rubber goods.

406. MACHINES, APPARATUS, AND IMPLEMENTS USED IN SEWING, MAKING CLOTHING AND ORNAMENTAL OBJECTS.

Sewing and knitting machines, clothes-making machines. Tools for sewing and making garments. Machines for sewing, hemming, stitching and embroidering.

Machines for preparing and working leather cutters.

Machines for making, nailing or screwing boots and shoes.

Machines for washing, ironing, drying and scouring, not shown in Class 632. Plant for public laundries.

Machines for making clocks and watches.

Machines for making jewelry and trinkets.

Machines for making buttons, pins, needles, etc. Machines for manufacture of rubber goods.

Machines for making brushes.

407. MACHINES USED IN PREPARING FOODS, ETC.

Flour mills. Mills for arrowroot, starch, etc.

Sugar-refining machines. Confectioner's machinery.

Machines for making capsules and other pharmaceutical products.

Oil-making machinery. Presses and stills.

Appliances and machines for manufacture of tobacco.

Mills for spices, coffees, etc.

Evaporating machinery for making condensed milk. Fruit evaporators.

Machinery and plant of abattoirs and slaughter-houses.

Distillers' and brewery machinery. Bottling machinery.

408. MACHINERY FOR PAPER MAKING AND PAPER WORKING, AND ALSO FOR TYPE-SETTING AND PRINTING. (See also Classes 816, 817.)

Paper-making machinery of all kinds.

Printing presses.

Bed and platen machines, hand presses, lithographic presses, and copper and steel plate presses.

Cylinder printing machines.

Rotary machines.

Type-setting and type-casting machines, etc.

Type-casting and type-finishing machines.

Apparatus for electrotyping, stereotyping in papier-mache, plaster, celluloid, rubber and kaolin.

Type-setting and casting machines.

Type-setting and distributing machines.

Matrix type-setting and type-casting machines.

Matrix-waxing and type-casting machines.

Book-binding machines.

Machines for book sewing and stitching. Cover making and printing machine, embossing and stamping, slotting and stapling, paging and numbering.

Paper-folding machines.

Newspaper and book folding machines.

Newspaper wrapping and addressing machines.

Folding attachments for printing presses.

Bag-making machines. Tag machines.

Paper and card cutting machines.

Book trimming and edge cutting.

Paper cutters: Guillotine, under-cut, plow cutters, slitters (rotary), shear knife.

Card cutters: Rotary, shear knife, perforating, punching and stamping machines.

Envelope and embossing machinery.

409. WHEEL VEHICLES, ETC.

History of wheel vehicles. Retrospective collections. Early methods replaced by present ones. Sedan chairs, litters, etc.

Carts and wagons and trucks for movement of heavy objects and goods.

Farm and country wagons. Milk and market wagons. Emigrant wagons. (See also Class 116.)

Freight and express wagons, drays, trucks, dumping wagons, etc.

Wagons for special use. Merchants' delivery and advertising wagons, ice-wagons, furniture vans.

Carriages for pleasure and travel: Coaches and carriages of all kinds, drags, buggies, road-wagons, sulkies, carts, buckboards.

Public vehicles: Stages, omnibuses, herdics, cabs, hacks, droskys, cab systems, etc. Hearses, ambulances, etc.

Parts of vehicles and wheelwright's work. Wheels, tires, hubs, axles, etc. Shafts and poles, bodies, covers, seats, springs, and systems of hanging vehicles. Cushions and upholstery, lamps, wheelwright machines, hardware.

Hand trucks, handcarts, wheelbarrows, bath chairs, jinrikishas, etc.

Road and street machinery. Rollers on wheels. Street-sweeping machines, street-sprinkling, road machinery.

Sleighs, sleds, and sledges. Snow-plows.

Cyclist's wheels. Bicycles, tricycles—foot, chain, steam, electric. (See also Class 832.)

Harness and saddlery: Saddles, pack-saddles, bridles, and harness for riding animals. Stirrups, spurs, driving and riding whips, blankets, robes, etc. Sleigh bells. (See also Class 181 and Class 837.)

41. Machinery and Motors (Continued). Railway Plant. (See also Class 822.)

NOTE.—For the arrangement of Classes 410-419, as well as that of 340-449 (relating to the steamship) I am indebted to Mr. J. Elfreth Watkins, of the National Museum.

410. LOCOMOTIVE ENGINES.

Steam engines, passenger and freight.

Electrical engines, passenger and freight.

Compressed-air and gas engines.

Boilers and gates. Gauges.

Pumps, injectors, and gauge cocks.

Pistons, slide valves, and steam chests.

Throttle levers and reversing gear.

Spark arresters, extension smoke boxes, and cinder collectors.

Tenders, tanks, water scoops and coal magazines.

411. CARS.

Passenger cars, parlor, dining, sleeping, special, observation, emigrant, sportsman's, officer's and paymaster's.

Express and baggage cars.

Mail cars: Appliances for dropping and picking up mail bags, for storing mail bags, and handling mail.

Freight cars: Box cars, gondola cars, coal and mineral cars, tank cars, refrigerator cars (meats and fruits).

Seats and furniture.

Lighting plant: Oil, gas, electricity.

Heating plant: Stove, hot air, hot water, steam, electricity.

412. PARTS AND APPLIANCES FOR LOCOMOTIVES AND CARS.

Wheels, wheel centers and tires.

Axles, journals, journal boxes and lubricating apparatus.

Truck frames, springs and appliances.

412. PARTS AND APPLIANCES FOR LOCOMOTIVES AND CARS—Continued.
Couplers and buffers, draw bars, vestibule appliances.
Brakes—Air, direct and automatic, steam, vacuum, electric.
Reservoirs, valves and other appliances.
Brake beams, brake shoes.

413. PERMANENT WAY.
Rails and splices.
Cross-ties, spikes and rail fastenings.
Splice bars, track bolts, stop washers.
Frogs and crossings.
Switches, points, levers, switch stands.
Models and drawings of permanent way, excavation and embankment, retaining walls, ballast, drainage systems, pipes and culverts.

414. SIGNALS.
Block system and semaphores.
Interlocking switch apparatus (lever, pneumatic and electric).
Railway telegraph and train telegraph apparatus.
Draw-bridge and tunnel signals.
Train signals—Bell cord and gong, pneumatic and electric.
Train flags, lanterns, torpedoes, fusees.

415. MECHANICAL ACCESSORIES TO RAILWAY PLANT.
Machine shops—Special tools for construction of rolling stock, erection of locomotives and manufacture of appliances for permanent way. Portable cranes and special tools for wreck cars and construction cars.
Graders, ditchers, and steam shovels. Snow plows and centrifugal excavators.
Wreck cars, dump cars, hand-lever cars and trucks.

416. STATIONS AND ENGINE HOUSES.
Passenger and freight elevators, transfer tables, furniture, ticket racks, baggage barrows.
Engine and car houses, turn tables and round houses, water tanks, track tanks.

417. RAPID TRANSIT IN CITIES.
Street railways—Permanent way. Rails, chairs, cross-ties and longitudinals. Switches and frogs.
Street railways and tramways—Horse cars and street-rolling stock.
Underground railways—Entrance to stations, stairways, platforms, safety gates, exit signals. Snow scrapers and track brooms. Grip devices, brakes. Lighting and heating arrangements. Safety gates.
Steam, electric and compressed-air motors.
Traction cable and pneumatic systems.

418. TICKETS, TICKET PUNCHES, FARE REGISTERS, STATION AND STREET ANNUNCIATORS, AND ALL MECHANICAL APPLIANCES FOR COLLECTING FARES ON ELEVATED AND STREET RAILWAYS.

419. GRAVITY ROADS AND TELFERAGE SYSTEMS.
Inclined planes, rack railroads, vertical railroads.
Telferage and suspended-cable lines. Machinery and appliances.

42. Electricity and its Applications. Special Monographic Exhibit.*

420. HISTORY AND PRINCIPLES OF ELECTRICITY.
Instructive apparatus to illustrate the history and to demonstrate the laws of magnetism and electricity to the student of natural philosophy.
Friction machines, Leyden jars, etc.

* For the arrangement of this class I am indebted to Mr. J. Elfreth Watkins, of the National Museum.

421. MAGNETS, ETC.
Lodestone, compasses (marine and surveyors'). Horseshoe and other magnets. Magnetic needle.
Appliances for making permanent magnets.

422. MACHINES AND APPARATUS FOR PRODUCING AND STORING ELECTRICITY (FOR POWER AND LIGHT).
Chemical batteries, coils and electro-magnets.
Dynamos—High and low voltage, direct and alternating. For arc and incandescent systems.
Storage batteries.
Portable batteries.
Special shafting and appliances for increasing speed.

423. APPLIANCES FOR THE TRANSMISSION AND REGULATION OF THE ELECTRICAL CURRENT.
Cables, wires and insulators, rheostats, switches, ammeters, resistance boxes, indicators and meters, voltmeters, hydrometers and converters.
Safety and protective appliances.
Lightning rods and ornaments, insulators, rods, cables and "grounds."

424. APPLIANCES FOR THE UTILIZATION OF ELECTRICITY DIRECT OR BY STORAGE BATTERIES.
Boat and car motors, boat-steering apparatus, electric locomotives. Overhead and underground systems. Fan, sewing-machine, dental and other small motors. Cables, insulators, etc.
Thermal batteries, etc. Electric musical appliances. Magnetic locks. Chandelier and lamp lighters. Appliances for igniting torpedoes and explosives.
Apparatus for removing incrustation from steam boilers.

425. ELECTRIC TELEGRAPH AND SIGNALS.
Transmitters, receivers, switch boards, and all special appliances for single, duplex, and quadruplex telegraphy. Keys, relays, repeaters. Tickers and brokers' lines.
Bells, burglar alarms, clocks.
Mechanical code transmitters.

426. ELECTRIC LAMPS AND FIXTURES.
Arc lamps—Single, duplex. Carbons and attachments. Incandescent lamps, etc.
Plugs and all other appliances for lighting.

427. TELEPHONES. (See also Class 813.)
Receivers, whisperphones, switch boards, indicators and safety appliances, annunciators. Special wiring.
Auxiliary apparatus for central stations and series systems.

428. ELECTRO-CHEMISTRY.
Electro-metallurgy, electric welding, electrolysis.
Electroplating. Reproduction of relief work and works of art.
Electrotyping. Appliances used for making plates for printing and illustration.

429. THERAPEUTIC AND OTHER APPLIANCES, NOT ELSEWHERE CLASSED.
Medical machines, baths, brushes, rollers, galvanic chairs, circuit terminals, body wear, electrodes.
Instruments for criminal execution may also be shown.
Electric pens and gravers.

43. *Chemical Manufactures, etc., Oils, Soaps, Waxes, Glues, Paints, Dyes, etc., Painting and Dyeing.*

430. PRINCIPLES OF APPLIED CHEMISTRY.

431. THE MANUFACTURE OF ACIDS AND ALKALIES.
Vegetable acids—Acetic, citric, tartaric, oxalic, etc.

431. THE MANUFACTURE OF ACIDS AND ALKALIES—Continued.

Mineral acids—Sulphuric, nitric, boracic, hydrochloric, etc.

The common commercial alkalies—Potash, soda and ammonia, and their compounds.

Neutral salts of the alkalies, as saltpeter, borax, sulphate of soda, nitrate of soda, etc.

Lime, magnesia, barytes, strontia, alum, etc.

Acetate of lime, etc.

432. MISCELLANEOUS CHEMICAL PRODUCTS OF INORGANIC ORIGIN, PYROTECHNICS, EXPLOSIVES.

Sulphur, and its uses.

Non-metallic substances, as sulphurate of carbon, chloride of sulphur, prussiate of potash, etc.

Metallic compounds, as salts of iron, copper and lead.

Explosive and fulminating compounds.

Black powder of various grades and sizes. Nitro-glycerine and the methods of using and exploding. Giant powder, dynamite, dualin, tri-nitro-glycerine.

Pyrotechnics for display, signaling, missiles.

433. THE MANUFACTURE OF GASES.

Manufacture of illuminating gas and coke. Tanks and plant.

Nitrous oxide, oxygen, for heating, lighting, metallurgical and remedial uses, chlorine and carbonic acid gases.

434. DISTILLING INDUSTRIES. MANUFACTURE OF PERFUMES, ETC.

Distillation of spirits. Wood alcohol.

Distillation of turpentine and its products.

Distillation of coal-tar products.

Refuse petroleum, slate oil, paraffine, phenyl, acid benzoic, aniline, etc.

Distillation of essential oils and perfumery manufacture. Materials, methods, products.

Musk, civet, ambergris.

435. OILS, FATS, SOAPS AND WAXES. THEIR PREPARATION AND USE.

Organic oils and fats: Mammal oils and fats. Whale and sperm oils. Butters, lards, tallows. Bird and reptile oils. Fish oils, derived from body tissue (as menhaden oil), and from liver (as cod-liver oil).

Vegetable oils, from various seeds—Olive, cotton-seed, peanut, palm, cocoanut, etc.

Methods and implements of oil rendering. Boiling and steaming. Sun rendering. Cold pressing. Chemical processes. Churning.

Products of organic oils, soaps and detergents. Glycerine. Stearine. Oleomargarine, etc. Pomades and cosmetic products. Drying oils, candles, of stearine, glycerine, paraffine, etc.

Lubricating oils.

Waxes, spermaceti, etc.

Bees-wax and other animal waxes, wax candles.

White wax and other vegetable waxes.

Vegetable substitutes for soap, such as soap-berries (*Sapindus saponaria*), soap-roots (*Saponaria officinalis*), iuillac bark, etc.

Spermaceti and sperm candles.

Mineral oils: Petroleum and its manipulation.

Petroleum products, paraffine, vaseline, benzine, napthaline, aniline, etc.

436. GLUES AND CEMENTS, GUMS AND RESINS.

Gums and mucilaginous substance. Mucilaginous seeds, barks, pods and algæ. Gums, made artificially, as "British Gums." Glues prepared from vegetables.

436. GLUES AND CEMENTS, GUMS AND RESINS—Continued.

Resins. Gum resins and balsams. Tars. Gum elastics and gutta-percha. Distilled resins.

Mineral resins, polishers and glues. Asphalt and bitumen. Coal tar. Soluble glues. Mortars. Cements. (See also under 22.)

Varnishes and japans, and their manufacture.

Gelatines. Glues, etc., of animal origin, from mammal hides and hoofs. Fish glues. Isinglass, etc. Court-plaster.

437. INDIA RUBBER AND CELLULOID.

India rubber, gutta-percha and caoutchouc.

Impermeable articles—Clothing and foot wear, hydrostatic and air beds, water and air cushions, gas bags, bellows, valves, water and air-proof articles of every description.

Elastic articles—Elastic webbing and its uses, accessories of costumes, springs and buffers of every description, washers, valves, etc., surgical and hygienic articles, rubber corks and stoppers.

Molded, embossed and colored. Maps, bottles, bags, furniture covers, etc.

Vulcanized rubber, in all its applications and in combination with metals.

Gutta-percha in all its applications as a solid material and in solutions.

Other uses of rubber.

Celluloid and its applications.

"Coralline," and other similar materials.

438. PIGMENTS AND DYES.

Pigments, stains and dye materials of animal origin. Galls, etc., from animals: Ox gall. Colors from insects: Cochineal lac, etc. From mollusks: Tyrian purple, etc., lehia. Essence d'Orient, or pearl white. Mummy pigment, bone black, animal charcoal. Hydrocarbon blacks. Thickeners used in dyeing albumen.

Pigments and stains from vegetables. Flowers and leaves: Indigo, Persian berries, safflower, saffron. Roots: Madder, turmeric.

Dye-woods and barks: Log-wood, Brazil wood, sandal-wood, peach wood, cane wood, fustic, quercitron, etc.

Nutgalls from Hymenopterous insects and Aphides.

Lichen colors: Archil, cudbear.

Argol, cream of tartar, oxalic acid.

Astringents used in dyeing: Sumac, myrobolans.

Pigments, stains, etc., from earths, oxides of iron, lead, zinc, etc.

Chemical dyes: Prussiate of potash, *album græcum*, permanganate of potash, etc.

Aniline, napthaline and phenol dyes.

Mordants, salicylic acid, tin, iron.

Mineral thickeners, metallic paints for vessels, gilts, bronzes.

Flockings.

Colors and dyes mixed for use.

439. PAINTING, DYEING, STAINING, VARNISHING, GILDING, BLEACHING, ETC.

Use of water colors.

Use of distemper colors, kalsomines, fireworks.

Use of oil colors.

Painting with vitrifiable colors on glass or pottery. (See 25–126.)

Staining and dyeing of silk and wool.

Color printing on cotton, etc.

Color printing in manufacture of wall paper.

Staining glass. (See also Class ——.)

439. PAINTING, DYEING, STAINING, VARNISHING, GILDING, ETC.—Continued.
Varnishing, lacquering, japanning, polishing, preserving on wood and metals. Samples of lacquer. Inlaid lacquer, etc.
Gilding with gold leaf and water gilding.
Bleaching materials and processes.
Cleansing of soiled fabrics
Fabrics of all kinds, shown as results of dyeing or painting processes.

44. Pottery and its Manufacture. The Ceramic Art.

440. HISTORICAL COLLECTION.
Prehistoric pottery: Old World, New World.
Pottery of uncivilized races: Asiatic, Australasian, African, South American, North American.
Oriental Pottery: Egyptian, Phœnician and Judean, Assyrian and Babylonian, Western Asiatic, Arabian and Maghreb, Persian, Hindoostanese, Chinese, Corean, Japanese.
European Pottery—Classical Period: Grecian, Etruscan, Roman and of the Roman Colonies.
European Pottery—Mediæval Period: Hispano-Moresque, Italian, French, German, English.
European Pottery—Renaissance and Recent Period: Italian, French, German, Swiss, Dutch and Belgian, English, Spanish and Portuguese, Scandinavian, Russian.
South American Pottery: South American and Mexican.
North American Pottery: United States.

441. SOFT POTTERY.
Unbaked bricks, adobe, etc.
Terra-cotta, bricks, common and pressed, tiles, architectural forms, etc.
Tessaræ from powdered clay.
Unglazed pottery.
Lustrous pottery.
Glazed pottery (drain tiles, sewer pipes, etc.).
Enameled pottery (including delft, majolica, enameled lava, etc.). Enameled tiles.

442. HARD POTTERY AND ITS MANUFACTURES.
Fire bricks, crucibles and pots.
Stone ware, hard pottery, iron stone china. Druggists' and chemical ware.
Floor tiles. Encaustic tiles.
Brown ware, with salt glazing, colored and uncolored bodies.
Other articles of hard pottery.

443. PORCELAIN AND ITS MANUFACTURES.
Hard paste porcelain, including parian, statuary, porcelains, etc. Biscuit ware.
Soft paste porcelain, tender and with silicious bodies, implements and processes.

444. MATERIALS OF MANUFACTURE.
Clays (china, ball, sagger), kaolin, feldspar, etc., enameling and coloring materials.

445. LATHES, APPARATUS FOR ENGINE TURNING, STAMPS, ETC.

446. PROCESSES AND IMPLEMENTS OF PAINTING, PRINTING, GLAZING, CRACKLING, ETC.
On bisque by hand.
On bisque transferred.
On the glaze by hand.
On the glaze printed by force.

446. PROCESSES AND IMPLEMENTS OF PAINTING, ETC.—Continued.
On the glaze printed by hand.
Gold, silver and steel lashes.
Enameling.
Gilding.
447. POTTERY OVENS AND ENAMEL KILNS.
448. DICTIONARY COLLECTIONS.
Forms of vessels and other articles of pottery.
Manufacturers' marks.
449. POTTERY AND PORCELAIN FOR ARCHITECTURAL, TABLE AND TOILET USES.

45. Glass and Enamels.

450. ANCIENT GLASS AND ITS HISTORY.
Glass of Assyria and Cyprus. Ancient European glass.
451. MATERIALS FOR GLASS MAKING AND THEIR COMBINATIONS.
Sands. Limestone. Potash.
452. GLASS CASTING. MANUFACTURE OF PLATE GLASS.
Plate glass—rough, ground and polished. Pressed. Rolled.
Glass for floors and pavements.
453. GLASS MOLDING.
Molded bottles and other wares.
454. GLASS-BLOWING AND ITS PRODUCTS.
Manufacture of cylinder glass. Glass for windows, of all grades and qualities.
Manufacture of bottles, vials, tubes and pipes. Chemical glassware.
Fancy glass blowing and welding.
455. PREPARATION OF "SURFACE GLASS."
Polishing glass.
Grinding glass surfaces. Cut glass and crystal for table use.
Engraving with lathes.
Etching and embossing.
Sand-blast processes.
456. MANUFACTURE OF ORNAMENTAL AND DECORATIVE GLASS.
Bohemian glass-working. Venetian glass. Austrian glass. Ruby glass.
Manufacture of Roman pearls, beads, etc., crustated jet, spun glass, paste jewelry, colored glass for mosaics, etc., stained glass, pot metal and tinted.
Other ornamental glass—crackled filigree, tempered.
Millefiori and aventurine glass.
457. MANUFACTURE OF LENSES AND OPTICAL INSTRUMENTS.
Lenses for telescope, microscope, photo-camera refractive apparatus. Prismatic lenses for light-houses.
458. MIRROR FABRICATION.
Mirrors for optical and decorative use.
Looking-glasses.
459. ARTICLES OF GLASS, OR GLASS IN COMBINATION, NOT ELSEWHERE CLASSED.
Manufactured windows. Ventilators and shades.

46. Metal-working Handicraft: Clocks and Watches, Cutlery, and other products, not elsewhere classed.

461. PRODUCTS OF THE SILVER AND GOLDSMITH'S ART.
Hall marks in plate. Church plate. Decorative and table plate. Articles of gold and silver for personal use or the house. Trophies and prizes.

462. PRODUCTS OF THE CUTLER'S ART.
Grinding, sharpening, polishing, burnishing.
Hand tools and instruments used by carpenters, joiners, and for wood and stone in general.
Miscellaneous hand tools used in industries, such as jeweler's, engraver's, etc.
Cutlery, knives, penknives, scissors, razor straps and other implements.
Other edge tools.

463. PRODUCTS OF THE CLOCK MAKER'S ART.
Watches, chronometers, clocks, mantle clocks, and all other timepieces and reckoners, not shown as accessories of costume, of house fitting, of the decorative arts, or of sciences.
Astronomical clocks and chronometers.
Public clocks and their illumination.
Pedometers.

464. PRODUCTS OF THE GUNSMITH'S ART.
Firearms, guns and pistols, not shown as military and hunting weapons.

465. PRODUCTS OF THE BELL-MAKING ART.
Hand bells, steeple bells, etc.

466. HARDWARE (SHOWN AS A PRODUCT, RATHER THAN AS A MATERIAL OR ACCESSORY).
Hardware used in construction, exclusive of tools and instruments. Spikes, nails, screws, tacks, bolts, locks, latches, hinges, pulleys. Plumber's and gasfitter's hardware, furniture fittings, ship's hardware, saddler's hardware, and harness fittings and trimmings.

467. GOLD-BEATING AND THE MANUFACTURE OF FOILS.
Materials, processes and products.

468. CASTINGS IN VARIOUS METALS, NOT ELSEWHERE PLACED.

469. FORGED WORK IN VARIOUS METALS, NOT ELSEWHERE PLACED.

47. Furs and Leathers.—Tanning and Currying.

471. LEATHERS.*
Tanned leathers—belting, grain, harness leather. Sole leather. Oak, hemlock and union leather. Upper leather, and leather tanned for all other purposes. Calf, kip and goat skins tanned and finished. Sheepskins tanned. Splits tanned. All other tanned leather.
Curried leathers—calf, kip and sheep skins finished. Sides of finished leather for all purposes. All other skins finished.
Patent and enameled leathers. Morocco—black enameled leather. Black japanned grain leather. Colored enameled leather (Morocco finish). Black and colored splits. All other products.
Other leathers—rawhides, babiche, etc. Bull sinew. Rough-tanned leathers; crop kid, offal, bragils. Horse butts and hides; calf, seal and hog skins. Alligator, porpoise, walrus and kangaroo leather. Russia leathers; imported and American. Oil leather; buckskin, doe, calf, lamb, sheep, ox, cow, cape sheep. White or alum leather. Horse, calf, sheep, lamb, kid, for gloves, white and dyed. Parchment for deeds and bookbinding. Vellum for bookbinding, painting, drumheads, and gunpowder sieves. Bladder. Gold beater's skin, etc. Catgut. Fish leather, eel skins, shagreen. Stamped and embossed leather. Other leathers.

472. FURS AND SKINS.
Furs of the cat tribe.
Furs of the wolf tribe.

*The classification of tanned, curried, and patent leathers is that adopted by the Eleventh Census.

472. FURS AND SKINS—Continued.
Furs of the weasel tribe.
Furs of the bear tribe.
Furs of the seal tribe—fur seals, Alaska, Oregon, South Georgia, Shetland and Siberia, undressed, plucked and dyed. Hair seals—Greenland and Labrador seals, spotted seals, silver seal, harp seal, saddle-back.
Furs of rodent animals, squirrels, chinchilla, beaver, hares and rabbits.
Skins and rugs of hoofed animals.
Miscellaneous furs.
Bird skins treated as furs—swan and swan-down skins, goose and goose-down used as swan-down, grebe, eider duck, penguin.

473. TANNING MATERIALS.
Tan barks, as hemlock, oak, Brazilian, acacia, etc.
Oak and hemlock bark extracts.
"Pods, berries, seeds, and fruits, as Algaraab, acacia, Nib-Nib, and Divi-Divi pods."
Galls.
Catichu Kino. Gambier. Sumac.
Mineral substances, as alum.
Currier's oil.

474. METHODS OF TANNING AND PREPARATION.
Tanning and currying of leather.
Dressing fur skins. Indian tanning. Oil dressing.
Preparation of white or alum leather, red leather, etc.
Preparation of parchment and vellum.
Manufacture of enameled and japanned leather.
Manufacture of Morocco, roan and other dyed leathers.
Manufacture of rawhide, babiches, etc.
Plucking and dyeing furs.

475. BOOT AND SHOE MAKING.
Products of all kinds.

476. HARNESS AND SADDLERY MAKING.
Products of all kinds, not shown in Class—.

477. MANUFACTURE OF TRUNKS AND BAGS.

478. MANUFACTURE OF BRACES, BELTS, ETC.

479. LEATHER ARTICLES NOT ELSEWHERE CLASSED.

48. The Textile Industries.

NOTE.—For the arrangement of this division I am indebted to Mr. S. N. D. North. The classification is that adopted for the Eleventh Census of the United States, and it is suggested that, for purposes of future comparison and reference, the uniformity thus insured will justify the somewhat more minute specification than would otherwise be necessary.*

480. THE HISTORY OF CARDING, COMBING, SPINNING, WEAVING AND FINISHING.
Implements, and their evolution.
(Machinery now in use under 405.)

481. TEXTILE FIBERS, VEGETABLE, ANIMAL AND MINERAL.
Systematic collection of types.
Tests of tensile strength.
Illustrations of all fibers at all preliminary stages of manipulation.

* Certain products of the textile industries will, of necessity, be shown in Department 6, in connection with house fittings and costume. In many instances this display will be made by dealers, while manufacturers will arrange their products in Department 4.

Cotton flannels.
Fine and fancy woven fabrics.
Duck, ticks, denims and stripes
Bags and bagging.
Upholstery goods—tapestries, curtains, chenilles.

484. Woolen and Worsted Fabrics.

1. Partly manufactured products.
   Woolen card rolls.
   Woolen yarns, all wool; union or merino.
   Worsted tops, noils and yarns.
   Shoddy and mungo.
   Wool extracts.
2. Woolen goods—all wool.
   Woolen cloth. Doeskins, cassimeres, cheviots, indigo flannels and broadcloths, for men's wear.
   Overcoatings, cloakings and kerseys, for both men's and women's wear.
   Carriage cloths of all weights.
   Wool dress goods, sackings, tricots, ladies' cloth, broadcloth, and other all-wool goods, for women's wear.
   Flannels, blankets, horse blankets, carriage robes.
   Buntings.
   Woven shawls (woolen).
3. Worsted goods.
   Worsted coatings, serges and suitings, for men's wear.
   Worsted dress goods, cashmeres, serges and other worsted goods, for women's wear.
4. Union or cotton mixed woven goods.
   Unions, tweeds, cheviots, cassimeres, and other goods for men's wear.
   Overcoatings and cloakings.
   Sackings, tricots and dress goods for women's wear.
   Flannels and linseys.
   Blankets, horse blankets.
5. Goods woven on cotton warps.
   Cassimeres, doeskins, jeans, coatings and suitings for men's wear.
   Overcoatings and cloakings.

484. WOOLEN AND WORSTED FABRICS—Continued.

6. Upholstery goods.
   Woolen upholstery goods—tapestry, terry, rep and damask.
   Worsted or mohair upholstery goods—tapestry, plush, terry and rep.
7. Sundries and small wares.
   Webbing and gorings.
   Bindings, beltings, braids, galloons, fringes and gimps.
   Cords and tassels.
   Suspenders, braces, and all elastic fabrics.
   Dress trimmings, embroideries, etc.
8. Felt goods.
   Felt cloths.
   Trimming and lining felt.
   Felt skirts and skirting.
   Table and piano covers.
   Felts for ladies' hats. Saddle felts. Druggets.
   Endless belts for printing machines.
   Rubber-shoe linings and other foot wear.
   Hair felting.
9. Carpets and rugs.
   Ingrains, two-ply and three-ply and art carpets.
   Tapestry and body Brussels.
   Tapestry velvet, Wilton or Wilton velvet, Axminster, moquette.
   Tapestry, Wilton, moquette, ingrain and Smyrna rugs.
   Other woolen rugs.
   Rag carpets.
10. Wool Hats of every description.

485. SILK FABRICS.
   Organzine, tram, spun-silk yarn.
   Machine twist and sewing silk.
   Fringe, knitting, embroidery and floss silk.
   Tie silks and scarfs.
   Gimps and trimmings, braids and bindings.
   Ribbons, laces.
   Dress and cloak trimmings.
   Military trimmings.
   Dress goods, figured and plain.
   Tailor's linings.
   Upholstery goods—Tapestries, curtains, velvets, plushes.

486. HOSIERY AND KNIT GOODS OF COTTON, SILK, WOOL, OR MIXED FIBERS.
   Shirts and drawers, hosiery, mittens and gloves.
   Jersey cloths.

487. FABRICS OF HEMP, FLAX, JUTE, AND OTHER VEGETABLE FIBERS OTHER THAN COTTON.
   Hemp jute and linen yarns.
   Bags and bagging, twines, threads.
   Linen cloths and drills, plain and mixed.
   Cambrics.
   All other fabrics of flax, hemp, jute, ramie, and other vegetable fibers.

488. MIXED AND SPECIAL FABRICS, NOT ELSEWHERE CLASSED.
   Laces of thread and cotton; laces of silk, wool, or mohair, made with the needle or loom, and not classified with the fine arts.
   Silver and gold lace.
   Silk and cottonet, plain or figured.
   Embroidery and tambour work.
   Crocheting, etc. Embroidery in gold, silver and silk.
   Embroidery, tapestry and other work done by hand.

ruling paper. Machines for cutting, tearing and stamping paper, etc.
Appliances for bleaching, coloring and finishing paper and tissues.
Appliances for printing paper hangings and tissues.

492. WRITING PAPER.
Stationery, envelopes, blank-book paper, bond paper, tracing and linen-tissue paper, etc., as industrial products. (See also Classes 815–19.)

493. PRINTING AND WRAPPING PAPER.
Printing paper for books and newspapers.
Wrapping paper of all grades.
Cartridge paper. Botanical driers and covers.
Paper bags.

494. CARDBOARD AND PASTEBOARD. WALL PAPER.
Cardboard and cards. Playing cards (as articles of paper manufacture).
Binder's board and its uses.
Pasteboard, paper or cardboard boxes.
Pasteboard for walls, board roofs.
Tar-board and tar-paper.
Wall papers of all kinds, from paper-maker's standpoint.

495. PAPER PULP AND ITS USES.
Papier-maché, and articles of all kinds made from it.
Use of paper in making boats, buckets, etc.
Paper-felt for car wheels.

49b. Applications of Animal, Vegetable and Mineral Materials not Elsewhere Classed.

496. MISCELLANEOUS HARD TISSUES OF ANIMAL AND VEGETABLE ORIGIN.
Ivory, of elephant, whale, walrus and alligator.
Bones of cattle used in the arts, handles, etc. Albatross bones, for pipe-stems.
Horns of mammals, used solid and in laminæ. Horn combs, jewelry, etc.
Antlers, used for handles, etc.
Tortoise shell, and applications not elsewhere shown.
Whalebone, and applications not elsewhere shown.
Egg shells, as materials. Ostrich and emu eggs. Japanese egg-shell lacquer.
Quills and spines, for handles, etc., used in embroidery.

496. MISCELLANEOUS HARD TISSUES OF ANIMAL AND VEGETABLE ORIGIN—Cont'd.
Vegetable ivory, and its applications.
Nuts and nut shells used in arts.
Berries used in arts. Doom palm nuts, coquilla nuts, nicker nuts, sea beans, etc.
Gourds, calabashes, cocoanut shells, for dippers. Dutch rushes, aloe fiber, etc.
Teasels.
Fancy woods, used as material in small work, and illustrations of their use.

497. BRUSHES AND BRUSH-MAKING. (See also under 37.)
Brushes of hair and bristles, feathers, baleen, broom and other vegetable fiber.
Materials and methods of manufacture.

498. WADDINGS AND STUFFINGS.
Hair, bristles, feathers and other substances used.
Hair and wool of mammals.
Feathers and down of geese, ducks and swans.
Eider down.
Sponges, byssus, etc., used for stuffing.
Leaves and other vegetable products. "Pine tags."
Shavings (excelsior), chips and sawdust, used as stuffing.
Asbestus, hay, wool, etc.
Cushions and mattresses, not elsewhere shown.

499. FANCY AND DECORATIVE MANUFACTURED ARTICLES, NOT ELSEWHERE CLASSED.
Feathers, plumes, etc., of feathers or mammals' tails.
Birds stuffed for decoration, or wings used. Fans and screens of feathers. Decorative taxidermy.
Feather garments and robes. Feathers used as fur.
Hair embroidery. Chains, guards, jewelry.
Artificial flowers, not shown as articles of costume.
Embalmed flowers.
Ladies' ornamental and artificial work in wax, feathers, paper, wool, leather, or other material.
Decorative devices in shells, mosses, dried ferns, sea weeds, animals, birds, insects, or any natural production.
Articles of stone, metal, and wood, not elsewhere classed.
Other similar objects, not mentioned in detail.

DEPARTMENT 5.—FOOD AND ITS ACCESSORIES.*

50. Science of Food and Nutrition.

NOTE.—For the arrangement of this division I am indebted to Prof. W. O. Atwater, Director of the Office of Experiment Stations of the U. S. Department of Agriculture.

500. THE HISTORY OF FOODS. LITERATURE. FOLK-LORE.
Geographical distribution of special foods.

Food constitutes the largest of our agricultural productions, of the living expenses of the people, and of our export to Europe.

The agricultural production of the United States is one-sided. Our food supply for man and beast contains an excess of the materials which make fat and serve the body for fuel, and is relatively deficient in the nitrogenous compounds which make

*Nos. 51 to 56 may include adulterations and methods of adulterating. With the prepared products, the machinery and methods used in preparation may be shown.

blood, muscle, and bone. The farmer loses because his products do not fit the demands of the home and foreign markets. At the same time our national dietary has become one-sided, so that though we live upon a high nutritive plane, our food might be better fitted to our needs.

Wage workers and people of moderate incomes generally spend and must spend more than half their earnings for food. They do not understand either the relation of the nutritive value of food to its cost or its physiological effects. The result is great waste in the purchase and use of food, loss of money, and injury to health.

The agricultural production and exchange of this country and Europe are out of balance. European nations do not avail themselves fully of the food supplies of which we have too much and they not enough. This is illustrated in their opposition to American meats. It is as unfortunate for them as for us. The laboring classes in Europe are underfed. To give them the bodily strength and vigor which characterize our own working people, they need the very nutriment which we produce in such large excess.

The research of later years is showing clearly how the products of our farms may be better adapted to the demand of home and foreign markets. It is bringing the information which the people need to help them to fit their diet to the demand of health and purse. It is also showing why foreign nations should, in the interest of their poorly fed masses, remove the barriers they now oppose to our meats and other food products.

It is eminently fitting that these things be illustrated at the Exposition, which is to be for the education of both our own people and those of other countries.

501. THE CHEMISTRY AND PHYSIOLOGY OF FOOD AND DRINK.
Composition of foods. Constituents of foods, and their uses in nutrition. Nutritive values of different food materials.

502. DIETARY STANDARDS AND ACTUAL DIETARIES.
Food of people of different occupations, districts, countries, etc. Dietaries of factory operatives; mechanics; of the poor and the well-to-do. Prison and workhouse diet. Army and navy rations.

503. FOOD AND HEALTH.
Hygienic effects of food and drink. Over-eating and drinking. Unwholesome and improper foods, and diseases due to them. Ptomaines and other poisons occurring in foods. Bacteria in foods. Animal parasites.

504. ADULTERATIONS.
Adulterants used, harmless and injurious. Coloring substances. Adulterated articles. Apparatus used in compounding.

51. Animal Foods and Products from Them.

510. HISTORY OF ANIMAL FOODS.
Statistics and literature. Conditions of animal food.

511. MEATS, AND PRODUCTS PREPARED FROM THEM. (See also Class 189.)
Beef, mutton, pork, etc. (Fresh meats of different kinds and qualities illustrated by models and charts.)
Salt meats. Meat preserved by various processes. Dried. Smoked. Hams. Sausage. Other prepared meats. Canned meats. Preparations for soups. Meat extracts. "Peptones" and kindred preparations from meats. Proprietary articles.

512. POULTRY, GAME AND EGGS.

513. FISH.
Salt fish, pickled fish, codfish, herrings, etc. Fish preserved in oil—sardines, pickled tunny fish, etc. Canned fish. Caviar. Products prepared from fish. (See also Classes 371–373.)

514. SHELL FISH, ETC.
Crustacea and shell fish—lobsters, shrimps, oysters, preserved oysters, anchovies, etc. Canned oysters, lobsters, etc.

515. MILK AND DAIRY PRODUCTS.
Condensed milk, butter, cheese of all kinds, kumys.
516. GELATINE AND KINDRED SUBSTANCES.

52. Vegetable Food Products and Preparations from Them.

521. CEREALS AND PRODUCTS PREPARED FROM THEM.
Wheat, rye, barley, rice, maize, millet, and other cereals in the grain and when ground.
Flours and meals.
Hulled or decorticated grains. Grits, etc.
Crushed grains, etc.
Starch from potatoes, rice, lentils, etc. Tapioca, sago, arrow root, various starches, mixed farinaceous products.
Italian paste, semolino, vermicelli, macaroni.
Gluten and kindred products.
Products of the bakery and pastry shop.
Bread, all kinds, with or without yeast, fancy bread and bread in shapes, crackers, compressed bread for traveling military campaigns, etc., sea biscuit.
Various kinds of pastry peculiar to each country.
Ginger bread and dry cakes fit for preservation.
Domestic and home-made bread, cakes, pastry, etc.
Alimentary preparations as substitutes for bread, nouilles, pap.
Other products.
522. LEGUMES, BEANS, PEAS, ETC., AND PRODUCTS FROM THEM.
523. VEGETABLES AND PRODUCTS.
Potatoes, sweet potatoes, turnips, beets, carrots, etc.
Cabbages, cauliflowers, lettuce, etc.
Melons, pumpkins, etc. Onions, garlic, etc.
Vegetables preserved and prepared by various processes, pickled, desiccated, compounded, canned.
524. FRUITS.
Apples, pears, peaches, plumbs, cherries, grapes, etc.
Fruits preserved in sugar. Fruits preserved with sugar.
Dried fruits, figs, raisins, etc.
Canned fruits.
Nuts and nut-like substances.
Other fruits and preparations from them.
525. ICELAND MOSS AND ALLIED PRODUCTS.
526. PREPARED FOODS FOR INFANTS AND FOR INVALIDS. PROPRIETARY ARTICLES.
527. PECULIAR AND LESS USUAL VEGETABLE FOOD PRODUCTS.

53. Sugar, Confectionery, Fats, and Oils.

531. SUGARS AND ALLIED PRODUCTS.
Cane sugars, sirups, molasses, etc.
Sorghum sugars, sirups, molasses, etc.
Beet sugars, sirups, etc.
Maple sugar, sirups, etc.
Palm sugar. Milk sugar.
Grape and fruit sugars, natural.
Glucoses, etc., prepared.
Honey.
532. CONFECTIONS AND CONFECTIONERY.

542. BAKING SALTS AND POWDERS.
Chemical salts, saleratus, cream of tartar, etc.
Proprietary articles. Baking powders.

543. SPICES, MUSTARD, ETC.
Allspice, pepper, cinnamon, nutmeg, etc.
Mustards, curries, compound sauces. Proprietary articles.

544. FLAVORS AND FLAVORING EXTRACTS.
Natural flavors and essences. Vanilla, lemon, orange, etc.
Artificial flavoring matters.

545. AROMATIC HERBS.

546. VINEGARS.

55. Beverages and Materials used for Them.

550. HISTORY AND FOLK-LORE OF BEVERAGES.

551. CARBONATED WATERS, SODA WATER, GINGER ALE, MINERAL WATERS.

552. TEA, COFFEE, AND OTHER MATERIALS CONTAINING ALKALOIDS, AND USED FOR INFUSIONS.
Teas, coffees, coffee substitutes, chicory, etc.
Cocoa. Chocolate, etc.
Proprietary articles.

553. MALT BEVERAGES.
Beers.
Ales.
Brewers' supplies.

554. WINES AND CIDERS.
Wines of all kinds.
Cider, perry, etc.
Coloring materials and flavoring extracts.

555. DISTILLED LIQUORS.
Rums, whiskies, brandies, gins, absinthes, etc.

556. PECULIAR AND LESS USUAL ALCOHOLIC LIQUORS.
Pulque, palm wine, etc.

557. ADULTERANTS AND ADULTERATING PRODUCTS.
Flavoring materials, colors, and other substances used in changing character of liquors.

563. CIGARS.
564. CIGARETTES.
565. SNUFFS.
566. PIPES OF ALL NATIONS.
567. ACCESSORIES OF CIGARS AND CIGARETTES.
568. ACCESSORIES OF ALL OTHER KINDS.
569. FACTORIES OF ALL KINDS FOR MANUFACTURE OF ARTICLES SHOWN IN THIS DIVISION.

57. Peculiar and Less Common Foods and Food Products.

571. FOODS OF THE PEOPLE OF INDIA AS REGULATED BY CASTE AND TRADITIONS. OTHER NATIONS.
572. FOODS USED BY AMERICAN INDIANS.
573. FOODS USED BY PRIMITIVE PEOPLES ELSEWHERE.
574. MATERIALS NOT USEFUL FOR NUTRIMENT, BUT USED BY LESS INTELLIGENT PEOPLE.
Clay used by clay-eaters, etc.

58. Cooking Utensils, Products, Cooking Schools.

Chemistry and physiology of cooking.
580. HISTORY OF COOKING.
Literature. Folk-lore.
581. DOMESTIC COOKING.
Utensils. Stoves, kitchen and pantry conveniences, in use or otherwise.
Products.
582. COOKING IN PUBLIC INSTITUTIONS. UTENSILS. METHODS. PRODUCTS.
583. COOKING SCHOOLS.
The cooking-school movement in the United States and elsewhere.
Cooking as taught in public schools and by private enterprise.

59. Preparation, Conservation and Transportation of Food. Food Supply of the United States and Europe.

590. APPARATUS AND PROCESSES FOR STORING, CONVEYING AND DISTRIBUTING FOODS.
591. REFRIGERATION, ICING.
592. DRYING AND DESICCATING.
Drying without salt. Jerking. Desiccating. Drying with salt. Dry salting.
593. PICKLING AND CONSERVING (WITH ANTISEPTICS, SALT, VINEGAR OR SUGAR).
(*a*) In salt, brine, pickling.
(*b*) In vinegar, pickling.
(*c*) In sugar, conserving.
594. CANNING.
595. PREPARATION OF FOOD MATERIALS, EXTRACTS, ETC.
Machinery and appliances for the preparation of articles under Class 407.
596. TRANSPORTATION AND DISTRIBUTION OF FOOD.
597. THE PRESENT AND PROSPECTIVE FOOD SUPPLY OF THE UNITED STATES AND OTHER PARTS OF THE WORLD.
Exportation and importation. Shown by statistical charts, diagrams, etc.

DEPARTMENT 6.—THE HOUSE AND ITS ACCESSORIES—COSTUME AND PERSONAL EQUIPMENT.

60. Cities, Towns, and Villages.

Historical matter, plans, views, etc.

61. Domestic and Economic Architecture, Domestic Appliances.

611. THE DWELLING HOUSE.
Models and designs for, and specimens of, buildings.

612. MANUFACTURED PARTS OF BUILDINGS.
Sash, blinds, etc.
Fittings and accessories for dwelling houses.

613. MATERIALS FOR HOUSE CONSTRUCTION.
Materials for roofs, walls, damp courses, solid floors, damp proof, wall coverings, cements, etc.

614. LITERATURE OF DOMESTIC ARCHITECTURE.
Models, pictures, diagrams, etc.

615. LABORING MAN'S HOUSE.—CITY AND COUNTRY.

616. THE VILLAGE HOUSE.
As above.

617. THE SUBURBAN COTTAGE AND VILLA.
As above.

618. THE CITY HOUSE.
Drawings and models of dwellings characterized by cheapness, comfort, health. Cheap, moderate, expensive.

619. THE FLAT AND THE TENEMENT HOUSE.

62. Interior Architectural Fixtures and Decoration.

620. PRINCIPLES OF INTERIOR DECORATION AND ARRANGEMENT AND SANITATION. PLANS AND LITERATURE.

621. FLOOR COVERING.
Carpets of all kinds. Rugs. Druggets. Matting.
Oil-cloths and linoleum.

622. WALL COVERING AND DECORATION.
Printed papers. Paper with velvety surface, marbled, veined, etc. Artistic papers. Enameled and varnished papers. Imitations of wood and leather. Painted and printed shades.
Frescoing. Masticking. Papering, plastering, panneling, cornices, brackets, picture frames. "Carton-Pierre," "Lincrusta," etc.
Covered and decorated walls. Drawings.

623. WINDOW AND DOOR ARRANGEMENTS.
Curtains, screens, movable screens.
Fixtures. Cornices and brackets.

624. SEATS AND CHAIRS. SOFAS, DIVANS, ETC.

625. TABLES, FLOOR SCREENS, ETC.

626. CLOSETS, ETC.
Cupboards, wardrobes, sideboards, bookcases.

627. MANTELPIECES, ETC.

628. FABRICS USED IN FURNISHING.
Such as cotton, wool, or silk, plain and figured. Fabrics of horsehair, vegetable, leathers, moleskin, etc. Leathers used for hangings and furniture. Oil-cloths and linoleums.

629. IMPLEMENTS OF DOMESTIC INDUSTRY, NOT ELSEWHERE PLACED.

63. Furniture of the Dwelling House.

631. THE KITCHEN, PANTRY, AND LARDER.
Stoves and ranges for cooking. (See also Class 651.)
Cookery utensils of all kinds.
Tinware.

632. THE LAUNDRY.
Appliances for washing. Washing machines, clothes wringers, mangles, clothes bars, and other drying devices. (See also Class 406.)
Ironing tables. Irons, crimping and goffering machines.

633. THE DINING ROOM.
Tables, chairs, sideboards, buffets.
Table furniture. Glass, china, metal. Tureens, dishes, épergnes, tea and coffee urns and kettles. Decanters, wine coolers, castors. Knives, forks, spoons, chopsticks, etc. Nut crackers. Toothpicks. Drinking vessels.

634. THE SLEEPING ROOM.
Bedsteads, bed fittings, mattresses, bed covering, folding and adjustable beds.
Wardrobes.
The dressing and toilet table. Toilet mirrors.

635. THE NURSERY.
Cradles, cribs.
Baths and toilet fixtures.
Perambulators, etc. Baby carriages.
Nursery toys.

636. THE LIBRARY.
Bookcases, desks, tables, chairs, cases.

637. HALL, PORCH, AND LAWN.
Hat and coat racks, cane and umbrella racks.
Chairs, benches, rustic furniture.
Hammocks.
Lawn seats, tents, etc.

638. RECEPTION ROOM.
Chairs, tables, and all fine furniture.

64. Furniture and Fixtures for Public Buildings.

641. OFFICES AND COUNTING ROOMS, BANKS.
Desks, safes, file cases, etc.

642. SHOPS AND STORES.
Counters. Show cases. Shelf appliances.
Fittings for special establishments, as grocers, butchers, druggists, tobacconists, confectioners, batters, hardware, books and stationery. News stands.
Devices for display of goods.
Lay figures.

643. HOTELS AND RESTAURANTS.
Special furniture.
Furniture of ordinary types.
Annunciators.

644. PUBLIC HALLS, THEATERS, ETC.

645. CHURCHES.

646. SCHOOLS.

647. RAILWAY AND RAILWAY STATIONS.

648. VESSELS AND STEAMERS.

649. OTHER SPECIAL TYPES OF FURNITURE, NOT ELSEWHERE CLASSED.

65. Heating, Lighting, Ventilation and Water Supply.

651. STOVES, ETC.
Fireplaces, grates and stoves for domestic use. Apparatus for heating and warming, by hot air, gas, hot water, steam. (See also Class 631.)
Smoke abatement, etc.
Apparatus for the use of mineral oil for domestic and industrial purposes.

652. VENTILATING APPARATUS.
Ventilators, air inlets and outlets, cowls. Air straining and cleansing.

653. LIGHTING APPARATUS. (Shown also in Class 426.)
a. Electrical apparatus for illumination and domestic use, secondary batteries, electroliers, etc.
b. Apparatus for lighting by gas, gas-producers, gas meters, gas fittings, chandeliers, etc.
c. Oil and other lamps; mineral oil, vegetable and animal oils.
d. Candles and candle-holders.
e. Accessories of lighting, matches, safety matches.

654. FIRE PREVENTION APPARATUS.
Extinguishers, portable engines, domestic fire escapes, etc.

655. WATER SUPPLY.
Water supply and purification. Meters, water fittings, cisterns, etc.

656. HOUSE DRAINAGE.
Drains, construction and ventilation. Sewer, disconnection; sinks, traps, gulleys; the disposal and utilization of house refuse.
Disinfectants for domestic use.

657. CLOSETS.
Water and earth closets, ash closets, hot-air closets, commodes, latrines, disinfecting powders and fluids, insect-destroyers.

658. BATHS, ETC.
Bathing requisites of all kinds. Shower baths. Public and private wash houses; washing apparatus, etc.

659. HOUSEWIFERY.
Sweepers, washers, dusters, polishers, detergents.

66. Costumes and Parts of Costumes.

660. THE HISTORY OF COSTUMES, ETC.
Retrospective collections. Costumes of all lands and times. Costumed figures. Costumes as shown by portraits and other pictures. Fashion plates.
Literature of dress.
Curiosities, etc., of dress and bodily adornment. Tattoo patterns and processes. Mutilation and deformation.
Physiological effects of abuses of dress.

661. FEMALE COSTUME IN 1892-'93.
Complete costumes and separate outer garment. Fashion plates of the day.

662. ACCESSORIES OF FEMALE DRESS, 1892-'93.
Head covering. Bonnets and millinery.
Gloves, etc.
Foot covering.
Linen and made-up articles of all kinds.
Shawls, etc.

663. MALE COSTUME IN 1892-'93.
Complete costumes and separate outer garments.
Fashion plates of the day.

664. ACCESSORIES OF MALE DRESS, 1892-'93.
Hats of all models.
Boots, shoes, etc.
Gloves, mittens, etc.
Underwear and made-up articles of every description.
Haberdashers' goods in general.
Ready-made clothing in general.
665. SPECIMEN FABRICS OF ALL KINDS FOR MATERIAL FOR DRESS, NOT SHOWN IN CONNECTION WITH ITS MANUFACTURE.
666. ARTISTIC AND DECORATIVE TISSUES FOR USE IN DRESS.
Laces.
Embroidered tissues.
667. FURS, ETC., IN CONNECTION WITH COSTUME.
668. FEATHERS AND OTHER DECORATIVE MATERIALS.
669. COSTUMES FOR SPECIAL PURPOSES.
Stage costumes.
Dress of various trades and handicrafts.
Athletic and recreative costumes. (See also Class 892.)
Masquerade and fancy dress.

67. Jewelry and Trinkets.

670. HISTORY AND FOLK-LORE OF JEWELRY.
671. ORNAMENT PINS, BROOCHES, CLASPS, BUTTONS AND STUDS.
672. FINGER RINGS.
673. EAR-RINGS, NOSE-RINGS, AND LABRETS.
674. CHAINS AND ORNAMENTS CONNECTED WITH TIME-KEEPERS.
Chatelaines, pendants, seals, keys and amulets.
675. ORNAMENTS CONNECTED WITH COIFFURE.
Tiaras, pins, combs.
676. APPENDAGES TO GARMENTS.
Buckles.
677. TRINKETS OF ALL KINDS.
Decorated objects.
678. PRECIOUS STONES IN MOUNTING.
Manner of setting and cutting. Imitations. Jewelry of jet. Amber, pearl, mother-of-pearl, coral, steel, ivory, feather and hair work jewelry. Plated and imitation jewelry.
679. SNUFF-BOXES. CASES.

68. The Toilet and its Appliances.

680. HISTORY AND FOLK-LORE OF THE TOILET.
Retrospective collections. Literature.
681. DRESSING CASES.
Mirrors, brushes, combs, hair-dressing utensils.
682
Work-boxes, glove cases, fancy notebooks, jewelry boxes, caskets and scent bottles. Vinaigrettes, etc.
683. COSMETICS AND PERFUMERY.
Pomatums and bandolines. Almond paste, enamels, whitening powders, and rouges. Toilet masks. Actors' make-up articles. Perfumed oils, essences, extracts, and scent water, powders, pastiles, and scent bags. Aromatic vinegars, perfumes for burning, toilet soaps, anointing oils.
684. APPARATUS AND APPLICATIONS FOR BEAUTIFYING THE HANDS.
Manicure outfits.
685. APPARATUS FOR DRESSING THE HAIR.
686. APPARATUS FOR SHAVING AND TRIMMING THE BEARD.

69. Accessories of Costume and Personal Equipment.

690. GENERAL ACCESSORIES.
Brooches, buckles, pins, buttons, hooks and eyes, flowers and their holders. Artificial flowers.
691. MASKS, FANS, ETC.
692. CANES, UMBRELLAS, ETC.
Canes, umbrellas, parasols, hand screens.
693. BAGS, TRUNKS, ETC.
Bags, trunks, baskets, valises, saddlebags, pocketbooks, and other receptacles.
694. SMALL GOODS AND FANCY ARTICLES.
Eyeglasses, lorgnettes, etc.
Cigarette cases, cigar pipes, and pipe cases. Cigar and cigarette holders and cases. Snuff boxes.
Miscellaneous fancy articles and small goods in leather, wood, metal, glass, ivory, shell, lacquer, basketry.
695. POCKET CUTLERY AND WEAPONS FOR PERSONAL USE AND PROTECTION.
696. TRAVELING RUGS AND CUSHIONS.
697. WATERPROOF GARMENTS.
698. MISCELLANEOUS PERSONAL ACCESSORIES OF TRAVELING.
699. CAMP EQUIPAGE.
Tents, etc. (See also Class 849.)

DEPARTMENT 7.—THE DECORATIVE, PLASTIC, AND PICTORIAL ARTS.

71. The Decorative Arts.

710. HISTORY AND METHODS OF DECORATIVE ART.
Architectural exteriors and interiors. Decorative arrangement. Frames, pedestals and other accessories for uses of art.
711. ARTISTIC POTTERY.
Porcelains, tiles, etc.
Mosaics, tesselated, sectile, fictile, vermiculated, and groove. Venetian, Alexandrine, Florentine, Roman, and Indian.
712. ARTISTIC GLASS.
Engraved, painted, chased, etched, iridescent.
713. ECCLESIASTICAL AND OTHER ARCHITECTURAL GLASS.
714. ENAMELS.
Incrusted, cloisonné, champlevé, translucent, in relief. Painted enamels, Niello enamels. Incrustations of all kinds and inlaid enamels.
715. TAPESTRIES, EMBROIDERIES, AND NEEDLEWORK.
Products of the Jacquard loom.
716. METAL WORK.
Cast, forged, repoussé work.
Art bronzes and castings. Ormolu.
Gold and silversmiths' art. Filigrees. Galvanoplastic reproductions. Castings with metallic coating.
Gems and precious stones in metal work.
717. CARVINGS.
Carvings in stone (jade, agate, rock crystal), wood, ivory, and other hard materials.

718. WALL DECORATIONS.
Marquetry in fresco, distemper, polychromy, and by other methods.
719. COMPOSITE PRODUCTS OF DECORATION.

72. Architecture.

720. HISTORY OF ARCHITECTURE.
Schools of architecture.
721. ARCHITECTURAL DESIGNS FOR BUILDINGS.
722. METHODS OF STRUCTURE.
(See Engineering.)
723. ARCHITECTURAL MASTERPIECES.
Representations or plans of existing buildings.
Restorations from ruins or documents.
724. INTERIOR PLANS AND REPRESENTATIONS.
Apartments and details.
725. MONUMENTS AND MAUSOLEUMS.
726. PLANS OF FOUNTAINS AND STRUCTURES NOT EDIFICES.
727. STUDIES AND FRAGMENTS.
728. LANDSCAPE ARCHITECTURE.
Parks and grounds.

73. Sculpture.

730. HISTORY OF SCULPTURE.
731. STATUARY IN STONE.
732. STATUARY IN BRONZE AND OTHER METALS.
733. BAS-RELIEFS.
734. CARVED SEALS, DIES, AND GEMS.
735. MEDALS, DIE-ENGRAVING, ETC.
736. MODELS AND CASTS.

74. Drawing.

740. METAL-POINT DRAWINGS.
Silver point, etc.
741. LEAD PENCIL DRAWINGS.
742. CRAYON DRAWINGS.
Black chalk.
Sanguine, etc.
Colored crayons or pastel.
743. CHARCOALDRAWINGS.
744. PEN-AND-INK AND BRUSH-POINT DRAWINGS.
745. WASHED DRAWINGS.
India ink.
Sepia.
Other monochromes.
746. CARTOONS AND STUDIES FOR FUTURE WORK.
747 DRAWING FOR PROCESS WORK. (See 806.)
748. MATHEMATICAL AND MAP DRAWING.
749. MISCELLANEOUS.
Poker (burnt wood) pictures and other "sports."

760. HISTORY OF PAINTING.
Art museums. Portraits of artists. Schools of painting, etc. (Literature, prints, etc.)
761. ANCIENT PAINTINGS AND PICTORIAL DESIGNS.
762. ITALIAN SCHOOLS.
763. FRENCH SCHOOLS.
764. GERMAN AND AUSTRIAN SCHOOLS.
765. DUTCH AND FLEMISH SCHOOLS.
766. ENGLISH SCHOOLS.
767. SCANDINAVIAN, RUSSIAN, AND MINOR EUROPEAN SCHOOLS.
768. AMERICAN SCHOOLS.

77. The Reproductive or Multiplying Processes not involving Photography.

770. RELIEF-ENGRAVING.
Wood-cutting.
Wood-engraving.
Relief-engraving on metal.
Machine-ruling applied to relief-engraving.
771. INTAGLIO-ENGRAVING.
Line-engraving.
Etching.
Soft-ground etching.
The sand manner.
Dry point.
Mezzotint.
Roulette work.
Aquatint.
Punching. (Opus mallei.)
Imitation of crayon.
Stipple.
Machine-ruling applied to intaglio-engraving

773. SUBSTITUTE PROCESSES, *i. e.*, PROCESSES PARTLY CHEMICAL, PARTLY MECHANICAL, DEVISED AS SUBSTITUTES FOR THE OLDER HAND PROCESSES.
Relief-etching.
Clay-surface processes.
Graphotype.
Wax processes.
Methods involving the use of soft blocks.
Stenochromy.
Galvanography.
Processes involving the use of mercury.
Processes involving the use of gelatine surfaces.
Engraving by machinery. Relief.
Engraving by machinery. Intaglio (medal-ruling).
Nature-printing.
The Anastatic process.
774. COLOR-PRINTING.
From relief blocks.
From intaglio plates.
From planographic surfaces.

78. Photography.

780. HISTORY AND PRINCIPLES OF PHOTOGRAPHY.
The Daguerreotype.
781. APPARATUS AND ACCESSORIES.
Cameras of all kinds.
Flash apparatus, etc.
782. MATERIALS, FILMS, NEGATIVES, POSITIVES.
The studio and its accessories.
Silver prints, platinotypes, carbon prints, etc.
783. PORTRAIT WORK. COMPOSITIONS.
784. LANDSCAPE AND ARCHITECTURAL WORK.
785. APPLICATION OF PHOTOGRAPHY TO THE ARTS AND SCIENCES.
Prints on wood, stuffs, enamels, etc. (For photo-mechanical processes of engraving, see Division 79.)
786. PHOTOCHROMY.
787. THE STEREOSCOPE. THE STEREOPTICON.
788. ENLARGEMENTS (SOLAR AND ELECTRIC) AND RETOUCHED PHOTOGRAPHS, ETC., IN CRAYON, WATER COLOR, BY AIR BRUSH, ETC.
789. AMATEUR PHOTOGRAPHY AND ITS RESULTS.

79. Photomechanical Processes.

790. PROCESSES PRODUCING RELIEF BLOCKS (Line-Work, Half-Tone).
791. PROCESSES PRODUCING INTAGLIO PLATES (Line-Work, Half-Tone).
792. PROCESSES PRODUCING PLANOGRAPHIC PRINTING SURFACES, *i. e.*, PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY (Line-Work, Half-Tone).
793. COLLOGRAPHIC PROCESSES.
794. WOODBURYTYPE.
795. THE PHOTO-MECHANICAL PROCESSES APPLIED TO COLOR-PRINTING.
From relief blocks.
From intaglio plates.
From planographic surfaces.
From collographic films.
From Woodburytype molds.
796. DRAWING FOR PROCESS WORK, INCLUDING AIDS DEVISED FOR THIS KIND OF DRAWING. (See 747.)

DEPARTMENT 8.—SOCIAL RELATIONS AND PUBLIC WELFARE.

80. Folk-lore.

NOTE.—For the arrangement of this Division I am indebted to Prof. Otis T. Mason, whose judicious advice has also been of the greatest service in connection with the general plan.

800. FOLK-LORE IN GENERAL.*
Treatises upon the whole subject, encyclopedias, dictionaries. Systems of nomenclature.
Societies, their scope, organization and methods. Their publications, periodicals.
Libraries of books devoted to this subject.
Museums or collections of folk apparatus.

801. FOLK-TALES.
Sagas, hero tales, place legends, and all folk-philosophy or belief embodied in stories or in verse. In short, the method of accounting for natural and historical phenomena.
Books, toys and other illustrations.

802. FOLK-WISDOM.
Weather-lore, predictions, signs, omens. Whatever the folk pretend to know about the future of natural phenomena.
Books and other illustrations.

803. FOLK-SAWS.
Proverbs, riddles. The gathered wisdom of the folk.
Rule of thumb, etc.
Illustrations and literature.

804. FOLK-CRAFT.
Medicine, leechcraft, magic, hoo-doo prescriptions, whatever ignorant people do to heal the sick.
Amulets and talismans.
Pocket pieces, such as the *os mirabilis* of the raccoon, the horse-chestnut, the hare's foot, the nicker nut, etc.

805. FOLK-LAW (PRACTICE, TRIAL, JUSTICE, ETC.).
All things and practices of the folk for administering justice.
Lynch law, etc.

806. NURSERY RHYMES.
Lore of and for children. Child-lore has two meanings: 1. What the folk believe and practice about children. 2. Counting-out rhymes and other lore of the children themselves.
Books, toys, pictures, etc.

807. FOLK-RELIGION.
What the folk believe and practice respecting the spirit world. Their simple creeds and quaint worship.

808. FESTIVALS.
Public gatherings of all kinds for merry-making or celebrations.

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* Folk-lore is the beliefs and practices of the folk. By folk we mean all peoples that are uncivilized, all unlettered people among the civilized, and even the most enlightened persons when they are controlled by the beliefs of the unlettered or fall into their practices.

It will be readily seen that the materials of this science are embodied in what is said, called folk-moot; and what is done, called folk-life or custom. In each division of the subject will appear both kinds of material.

809. CEREMONIES.
Christenings, etc.
Weddings—Ceremonies and other accessories.
Funerals—Accessories of all kinds.
Other ceremonies.

81. Communication and Record of Ideas. (Language, Writing and Printing. Books not shown as literature.)

810. PRIMITIVE LANGUAGE.
Sign language. Pictographs.

811. LANGUAGES OF ALL NATIONS.
Alphabets, etc.
Examples in manuscript and printed.
Dictionaries and grammars.
Geographical distribution of languages, shown by charts, etc.
Linguistic systems.
Jargons and dialects. "World languages." Volapuk, etc.

812. ARTIFICIAL LANGUAGE.
Cryptograms and cipher systems.
Telegraphic and commercial codes. Code books, etc.
Semaphores, military and railway systems.
Stenography in all its aspects.

813. MESSENGER SERVICE.
Animals and birds. Carrier pigeons.
Mail and mail express systems, not governmental. History of mails.
Pneumatic messenger service. The "Rohr post."

813. TELEGRAPHS AND TELEPHONE, ETC.
The electric telegraph. History and accessories. Operatives and organization of service. Geographical distribution, etc., shown by maps. Statistics and literature.
(For instruments, etc., see 42.)
Telephone. Aërophone.
The photophone.
The graphophone and the phonograph.
Annunciators. "Tickers."

814. WRITING MACHINES.
The typewriter in all its forms.
The typewriter applied to type-setting. The linotype, etc. (See also 408.)

815. WRITING IMPLEMENTS AND METHODS.
Tools and methods. Historical—inscribed stones, notches on trees and sticks, primitive tallies. Tablets of stone, wood, metal (bronze), clay, wax. Palm leaves, bark, papyrus, skins, leather, parchment, paper. Parchment writings. Old manuscripts. Specimens of calligraphy of all nations. Systems of penmanship.
Stylus pencils of all kinds, for writing or drawing.
Pens and accessories.
Reservoir pens.
Inks and colors. Inkstands, etc. Erasers and all the appliances accessory to writing.
Duplicating apparatus. Stamps and pads. Stencils. Hectographs, etc. Electric pen. Manifolding. Presses and copy books.

816. THE ART OF PRINTING.
Type and its history. (See also 408.)
Type-setting and proof-reading.
Make-up. Sizes of books.

816. THE ART OF PRINTING—Continued.

Imposing and press work.

Examples of the art of printing in all countries and at all times.

Incunabula. Curiosities of printing.

Results of the various methods of illustration of books in black and colors.

817. THE ART OF BOOKBINDING.

Historical series. Examples of the finest work. Curiosities of binding.

Binders' materials and examples of the work in each. Vellum, leathers of all kinds, woven fabrics, papers, woods, metals.

Blank-books of all kinds, and blank-book paper, diaries, note and memorandum books. Journals and record books. Books for office and counting house. Albums and scrapbooks.

Portfolios and cases, pads and other forms.

All products of printers' and binders' work for use in writing, for economy of writing, and for use on the desk or writing table.

818. STATIONERY IN GENERAL. (See also 490–493.)

Paper of all kinds in form for writing or printing. Embossed and decorated note paper. Designs and methods.

Ruled paper. Specimens of ruling.

Receptacles for paper, envelopes, etc.

Blotting paper and pounces of all kinds.

Paper weights, files, cutters.

Clips, fasteners, binders, etc.

Wafers, glues, and all similar appliances, with their receptacles and accessories.

Sealing wax, signets and seals, and all accessories.

Scales, etc.

Blanks and bill-heads.

819. FILING AND INDEXING.

Appliances of all kinds for the permanent preservation and convenient use of letters, memoranda, cuttings, manuscript, and printed matter of all kinds.

82. Engineering and Constructive Architecture.* (Illustrated by Models and Drawings.)

820. HISTORICAL AND RETROSPECTIVE EXHIBIT.

Illustrating methods of ancient engineer architects—Chaldean, Egyptian, Babylono-Assyrian, Greek, Etruscan, Roman, Byzantine, Arabic.

821. SURVEYING AND TOPOGRAPHICAL ENGINEERING.

Surveys and division of the public domain.

State boundaries, monuments, boundary stones, and methods of marking territorial divisions.

Location, surveys and plots of cities and towns, parks, streets and suburban extension.

Routes of internal communication.

Plans for turnpikes and highways, and devices for construction and maintenance of roads, streets and subways, sewers, underground water pipes, gas mains, conduits, cables.

Systems of drainage.

822. HYDRAULIC AND MARINE ENGINEERING. (Marine Architecture—shipbuilding, etc., see 336.)

Plans showing methods of reclaiming land, arresting and controlling the flow of water—dikes, weirs, dams and water gates, aqueducts, reservoirs, water-works (water supply, see 261; canal system, see 315), canals, locks, slack-water navigation, removal of marine railways, slips, and hydraulic docks.

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* Arrangement by Mr. J. Elfreth Watkins.

822. HYDRAULIC AND MARINE ENGINEERING—Continued.
Obstructions in rivers and harbors.
River, harbor and coast surveys. (Seaports and harbors, see 31.)
Plans of submarine structures—foundations for piers, light-houses, docks and breakwaters. (Light-houses, see also 306; harbor protection, etc., 317, 318; for tools and machinery for hydraulic work, see 402.)

823. BRIDGE ENGINEERING. (Illustrated by drawings and models.)
Bridge designing. Drawings and charts showing methods of calculating stresses.
Foundations, piers, abutments, and approaches of stone, wood, etc.
Arch bridges of stone, wood or iron.
Suspension bridges of fiber, iron, chain and cable.
Truss bridges of wood, iron and steel—pony, bowstring, and plate girders, lattice girders, Fink, Bollman, Howe, Pratt, Warren, Post, Long, Whipple, and other trusses of special design.
Cantilever bridges. Draw-bridges. Rolling and swinging machinery.
Tubular bridges.
Railway, aqueduct, and other bridges of special design, not elsewhere classed.
(A chart showing date of completion, span, rise, weight and cost of the great bridges of the world would be of interest.)

824. TUNNELS. (For mine engineering, see 210–219.)
Profile and sectional plans of tunnels, shafts and approaches.
Air shafts and special devices for lighting and ventilation.
Shields, cases and protection of tunnel walls against water and landslides.
(For building stones, see 242–246).
(For tools and machinery for blasting and drilling, see 222; blasting and explosives, see 226.)
Charts of the St. Gothard Railway and other great tunnels might be shown.

825. MECHANICAL ENGINEERING.
The designing of locomotives, engines, and machines.
Plans of machine shops, and systems of machinery for manufactories and metallurgical establishments.
Machines for moving and handling heavy weights—cranes, etc.
(See also Classes 401–419).

826. RAILROAD ENGINEERING.
Location of railways—topographical maps showing preliminary surveys, profiles of cuts and fills, estimates of excavation and embankment, methods of determining curves and grades, locations of bridges and tunnels.
Plans of terminals with reference to water courses or other railways.
(For Permanent Way, Stations and Rolling Stock, see 41.)

827. MILITARY ENGINEERING.
Plans of fortifications and other military works.
Methods for the rapid construction of roads, railway bridges, telegraph lines, etc., in time of war.
Pontoons and other temporary bridges and structures of timber, etc.
Plans of portable hospitals and other buildings.
Field telegraphs, methods of transporting and erecting telegraph lines, captive balloon telegraph.
Field signal train.
(For War, see 886, A).

828. THE DESIGNING OF BUILDINGS AND MATERIALS OF CONSTRUCTION.
Plans of public buildings for special purposes. Large and small dwelling-houses.
Drawings and specifications for foundations, walls, partitions, floors, roofs and stairways.

828. THE DESIGNING OF BUILDINGS AND MATERIALS OF CONSTRUCTION—Continued.
Estimates of amount and cost of material.
Designs and models of special contrivances for safety, comfort and convenience in the manipulation of elevators, doors, windows, etc.
(For Heating and Lighting Systems, see 65)
(For Drainage and Sanitary Plumbing, see 650 and 873.)
Working plans for the mason, carpenter and painter—designs and models of bonds, arches, coping, vaulting, etc; plastering and construction of partitions; painting and glazing.
Plans of appliances for hoisting, handling and delivering.
Building materials to artisans—scaffolding and ladders. Special scaffolding for handling great weights. Portable cranes and power elevators.
Illustrations of the strength of materials.
Plans and sections of special architectural forms—metallic floor beams and girders. Hollow bricks and other architectural pottery for heating and ventilation. Metallic cornice and conduits. Shingles and sheathing. Glass roofs, floors, and accessories. Architectural hardware.
Methods of combining materials.
Protection of foundations, areas and walls against water.
Working plans for paving and draining.
(For Timber, see 176; for Building Stones, see 242–246; Masonry, see 248; Brick, Plain and Ornamental, see Division 44; Iron and Metals, see 276.)
(Cements and Mortars, see No. 281; Artificial Stone, see Class 282.)

829. INSTRUMENTS OF PRECISION FOR THE ENGINEER AND ARCHITECT.
Instruments of the draftsman.
Field instruments for measuring angles and leveling—compasses, theodolites, transits, rods and flags, levels, leveling by barometer.
Instruments for measuring lengths—rules, rods, chains, and tapes. Methods of adjusting instruments for temperature.
Instruments designed for rapid work for calculating cross-sections, etc.
Plumb lines for great depths, and appliances.
Testing machines and other instruments, not elsewhere classed.

829*a*. ENGINEERING SOCIETIES AND ASSOCIATIONS.

83. Property, Trade, Commerce and Intercommunication.

830. HISTORY OF COMMERCE AND INTERCOMMUNICATION.
Early routes of traffic and commerce. Commercial centers in past ages, shown by maps, etc.
Statistics and literature.

831. METHODS AND MEDIA OF EXCHANGE. STORES AND SHOPS.
Money—coinage and its equivalents. A collection to show the actual media of exchange in America in each period of a quarter of a century from the first settlement to the time of the confederation, and in each Presidential term since.
Similar collections of money for other countries and periods (not to be confounded with a numismatic collection which includes coins only) with bank notes and other paper circulating mediums.
Special collections of tokens, "shin-plasters," "wild-cat money," etc., illustrating the financial history of the country. Confederate bills. Continental bills. Postage-stamp money.
Commercial paper—bills of exchange, securities.
Methods of barter.
Weights and measures as used in commerce. Scales, balances, solid and liquid measure as sold to merchants.

831. METHODS AND MEDIA OF EXCHANGE—Continued.

Methods of conveyancing. Deeds and titles. Bills and receipts. Examples of papers and systems and everything pertaining to record of commercial transactions between two parties.

Precautions against counterfeits and misappropriation of funds, bell-punches, cash and check registers.

Counting-houses, stores, and shops. Organization. Methods of bookkeeping. Plans and drawings of exteriors and interiors. Ground plans, showing systems of arrangement. Counters.

Mechanical devices for distributing change.

Furniture and fittings.

Methods of distributing goods to purchasers. Devices used for wrapping and tying. Baskets and boxes.

Pictures of representative houses in America and abroad.

(For Advertising Systems, See 838).

Auctions and auction houses.

Auction catalogues.

Pictures of representative establishments.

Boards of trade. Merchants' produce, and stock exchanges.

Market houses and their accessories. Bazaars. Arcades.

832. EXPORT AND IMPORT. INTERSTATE COMMERCE.

History of traffic. Early routes. Commercial routes.

Routes of transportation and traffic.

Land transportation, with reference to transporting commercial wares.

Warehouses and their arrangement—plans and pictures.

Cars and other vehicles, as arranged for special traffic.

Devices for loading and unloading.

Water transportation, with reference to commerce. (Heads as under Land Transportation.)

Express and delivery companies.

The handling and delivery of goods (Manutention.)

Methods of record, etc. Custom-house methods.

Bills of lading, etc.

Duties. Bonded warehouses.

833. MARKETS. CENTERS OF SUPPLY AND DEMAND.

Maps, statistics and literature, showing the lines of distribution from the principal producing centers of the world to the countries which depend upon them for supply.

Similar exhibits, showing the lines of supply for the principal centers of consumption of mercantile wares.

Similar exhibits, showing lines of distribution for each of the principal articles of commerce.

Special market exhibits, showing the kind of wares especially acceptable to purchasers in non-producing countries. (Especially textiles, tools and food-products.)

Special collections showing the nature of articles exported or imported in large quantities from little-known countries.

Pictures of great market centers or other matters of interest in connection with the subject.

834. PRICES.

The history of prices as shown by ancient bills, etc. Ledgers, literature and statistical tables.

Curves showing fluctuations in prices and their causes.

Curves showing fluctuations of prices of real estate in America to town, in connection with increase of population and trade.

834. PRICES—Continued.

Descriptive catalogues and price-lists—historical and of the present time.

Trade journals—current numbers and files of back volumes.

Wages in different parts of America and of the world. Wages of different occupations, past and present, shown by curve diagrams, literature and statistical tables. (Treatment same as for prices.)

Cost of living in different places as shown by comparison of prices of commodities and of labor.

835. CAPITAL AND ITS INVESTMENT.

Loans and their management. The broker's trade and its methods.

The pawnbroker's business. Curiosities of same.

Mortgages and securities. Mortgage investment companies.

Building and loan associations.

Stocks and stock brokerage. Methods and appliances. Stock exchanges. Pictures and plans. History of American stocks, and the enterprises upon which they have been established. Literature and statistics.

The real estate business. Methods of advertising and exploiting. Real estate affairs in the several cities of the United States. Title companies. Examples of plats and methods of subdivisions.

Banks and banking. Methods. Pictures of buildings.

836. INSURANCE.

Fire insurance. History, literature and statistics.

Pictures of offices and buildings.

Marine insurance.

Life insurance. Companies. Mutual companies and societies.

Accident insurance.

Live-stock insurance.

Title insurance.

Glass and other special insurance systems.

Security and trust companies.

Safe-storage systems and companies.

(In every case the companies to be invited to exhibit to visitors in the exhibition the peculiar features of their systems.)

(Buildings to be shown by pictures and models. Literature and statistics to be exhibited and, if desired, distributed.)

837. SAFES AND TREASURE STORAGE.

Fire-proof and burglar-proof safes of all kinds.

Safety locks.

Safe-storage warehouses.

Burglar alarms, etc.

838. THE ART OF ADVERTISING.

History of advertising. Curiosities of advertising.

Sign boards and sign symbols. Tobacconists', barbers', and pawnbrokers' signs, etc. Photographers' show frames.

Show windows, and the art of arranging them. Examples and pictures.

Sign bills, posters, dodgers. "Sandwich men."

Delivery wagons, decorated and grotesque.

Gift and prize systems. Cards and pictures. Cigarette cards, etc.

Phonograph and other announcement systems.

Pictures and devices to be shown in public places. Actors' photographs.

Theatrical and amusement devices.

Mechanical and other devices in cars, steamboats, and other public places. Albums and book covers.

The circular systems. Mailing lists and mailing companies.

The agent and canvasser system. Sample sales.

838. THE ART OF ADVERTISING—Continued.
"Nickel-in-the-slot machines."
The advertisement pages of papers and magazines and their utilization. Pictures. Narrative and facetious methods, etc.
Advertising agencies.
Trade and advertising journals. Specimens and files.
Advertising labels and trade-marks. Attractive methods of wrapping and packing.

839. AMERICAN TOWNS AND CITIES AS TRADE CENTERS.
Collective exhibits from individual towns, arranged by States.
Pictures of business streets and blocks.
Transportation facilities. Stations and depots. Warehouses. Elevators and manufacturing establishments.
Characteristic industries, fully illustrated.
Plans of suburban and other subdivisions.
Public buildings, churches, schools, markets.
Characteristic scenery.
Representative men.
Local newspapers and directories.
Books by local authors and publishers.
History, literature and statistics.
(Each town to be assigned space like an individual exhibitor, on application.)

84. Recreation and Amusement.

840. THE HISTORY OF RECREATION. AMUSEMENTS OF PRIMITIVE PEOPLES.
Amusements of all nations. Pictures and models.

841. TOYS FOR CHILDREN.
Infants' toys. Rattles, trumpets, etc.
Moving and mechanical toys. Harlequins, etc.
Dolls, doll-houses and furniture.
Blocks, puzzles, etc.
Fireworks.

842. ATHLETIC EXERCISES AND SPORTS.
Gymnastic and calisthenic exercises and their accessories, and all devices for physical development.
Boxing—gloves, costumes. Prize fights.
Fencing—foils, masks, etc.
Cycling—wheels of all kinds, and accessories.
Winter sports—skates, sleds, toboggans and slides. Costumes.
Ball games—baseball, cricket, lacrosse, lawn tennis, polo, golf, football.
Quoits, bowls, skittles, shuffleboard.
Croquet.
Archery.

843. AQUATIC SPORTS. (See also Department 3.)
Boating—row-boats. Portable boats. Shells and racing.
Canoeing—canoes, for paddle and sail.
Sail-boats and their use.
Ice boats.
Yachts and yachting—pictures and models.
Swimming and surf bathing—appliances and dress.

844. SHOTGUN AND RIFLE.
Marksmanship—the shooting gallery. Rifle practice at long and short range. Pistol and air or spring gun. Weapons, targets, and methods of organization.
Hunting—blinds, decoys, sink-boxes, dogs, and their accompaniments and accessories. Costumes and accoutrements. Accessories of all kinds.

844*a*. ANGLING. (See Fisheries.)

844*b*. AMATEUR PHOTOGRAPHY. (See 71.)

844*c*. SKETCHING AND PAINTING. (See 75–77.)

845. ANIMALS AND PETS. HUNTING.

The saddles. Equestrian outfits. Saddles and harness for pleasure use. Whips and stocks. Spurs. Male costume and woman's habits.

Tournaments, anise-chases, hurdle-riding, etc.

The pleasure vehicle and its equipment. Harnesses, etc.

Hunting and pet dogs (see 187). Whips, whistles, collars, harnesses, blankets, etc.

Pigeons and homing matches. (See 186.)

Poultry. (See 186.) The game-cock. Muffs. Gaffs.

Pet birds and other pet stocks. (See 186.) Cages. Pens.

Horse-racing.

Fox hunting, coursing, etc.

846. GAMES OF SKILL AND CHANCE, INDOOR.

Billiards—tables and all accessories.

Cards—playing-cards and all accessories of all games. Schemes of games.

Dice and accessories of all games. Exhibits of gamblers' methods.

Draughts, dominoes, backgammon and similar games.

Chess—artistic chessmen. Schemes of games.

Miscellaneous games—puzzles and paradoxes of all kinds. Mechanical puzzles.

847. SOCIAL AMUSEMENTS, SHOWS AND DIVERSIONS.

Dancing and its accessories. Ball-room accessories. Favors. Masks and fancy dresses.

Ball-room decorations.

Private theatricals and tableaux vivants.

Pyrotechnic displays.

Fêtes, lawn parties.

Spectacles, pantomimes.

Panoramas and dioramas.

Stereopticon shows.

Jugglery and legerdemain.

Circuses, menageries, etc.

848. COLLECTING AND OTHER INDIVIDUAL RECREATIONS.

Amateur collections in natural history—minerals, fossils, birds, eggs, insects, antlers and trophies of the chase, plants, ferns, sea-weeds, etc.

Collections of coins, stamps, heraldic designs, advertising cards.

Collections of autographs, portraits.

Collections of play bills and historical pictures.

Collections of photographs, stereographs, etc.

Collections of prints, etchings, engravings.

Collections of pottery and porcelain.

Collections of general bric-a-brac.

Collections of literary bric-a-brac. Grangerized and extra illustrated books. Collections, etc. First editions.

849. OUTDOOR COSTUME AND EQUIPMENT. TRAVELING EQUIPMENT. CAMP OUTFIT AND ACCESSORIES.

Athletic and outdoor costume for man and woman and for general and special use.

Canes, staves, alpenstocks.

Hammocks and settees, camp stools and camp beds and cots.

Tents and canopies.

Portable houses.

849. OUTDOOR COSTUME AND EQUIPMENT—Continued.
Camp-cooking outfit and other accessories.
Traveling costumes. Rugs.
Traveling bags, valises, shawl straps, etc.
Trunks, chests.
Steamer chairs.
Lunch baskets and boxes. Hampers.
Picnic outfits for table.
Traveler's and camper's food and beverages.

849 *a*. PLEASURE RESORTS AND ROUTES OF PLEASURE TRAVEL.
Seaside and mountain resorts.
Pictures, maps, and all illustrative literature.
Hotels, guides, camps.
Fishing and hunting privileges.
Sportsman's gazetteers and directories.
Sporting literature. Libraries. Journals devoted to athletics, travel and outdoor affairs.
Public pleasure gardens, fest gardens, schuetzen parks, etc.

85. Music and Musical Instruments. The Theater.

850 HISTORY AND THEORY OF MUSIC.
Music of primitive people.
Crude and curious instruments. Combinations of instruments, bands and orchestras. Music books and scores. Musical notation.
History and literature of music. Portraits of great musicians.

851. SELF-VIBRATING INSTRUMENTS.
Drums and tambourines. Cymbals, triangles, gongs, castanets, "bones."
Bells, chimes, and peals.
Bell-ringer's instruments. Musical glasses.
Glockenspiels, xylophones, marimbas.
Music boxes.

852. STRINGED INSTRUMENTS PLAYED WITH THE FINGERS OR PLECTRUM.
Lutes, guitars, banjos and mandolins.
Harps and lyres.
Zithers, dulcimers.

853. STRINGED INSTRUMENTS PLAYED WITH A BOW.
The violin.
The viol, viola da gamba, viola, viola di amore.
The violoncello and the bass viol.
Mechanical instruments—hurdy-gurdy and violin piano.

854. STRINGED INSTRUMENTS WITH KEYBOARD.
The pianoforte—square, upright and grand.
Actions and parts of the piano.
The predecessors of the piano: Clavicytherium, clavicymbal, clavichord, manichord, virginal, spinnet, harpsichord and hammer harpsichord.
Instruments and methods of manufacture.
Street pianos.

855. WIND INSTRUMENTS WITH SIMPLE APERTURE OR PLUG MOUTHPIECE.
The flute, flute-a-bec. Syrinx. Organ pipes. Flageolet.

856. WIND INSTRUMENTS, WITH MOUTHPIECE REGULATED BY THE LIPS.
The clarionet, oboe and saxophone.

857. WIND INSTRUMENTS, WITH BELL MOUTHPIECE, WITHOUT KEYS.
The trumpet (simple) and the bugle. Oliphant. Alpenhorn.
The trombone (with slide and with finger holes).
The serpent, bassoon and bagpipe.

858. MUSIC IN RELATION TO HUMAN LIFE.
Musical composers. Portraits. Biographies.
Great performers. Great singers.
Concerts and the concert stage.
The opera. Its history.
The oratorio. Masses.
Church music and sacred music of all periods. Hymnology, ballads, folk song and folk-music of all lands.
National airs.

859. THE THEATER AND THE DRAMA.
The stage. Plans and models of stages and theaters.
History of the drama, so far as can be shown by literary record. Portraits of actors. Relics of actors.
Playbills, etc.
Costumes, masks, armor.
Scenery. Appliances of illusion, etc.
Plays of all ages and peoples.
The passion play of Oberammergau.

86. Medicine, Surgery, Pharmacology, Hygiene.

860. HISTORY OF MEDICINE.
Schools of medical theory. Portraits of physicians.

860*a*. APPLIANCES OF RESEARCH IN ANATOMY, PHYSIOLOGY, BACTERIOLOGY, ETC. (See Science, 9216–9256.)

860*b*. APPLIANCES OF INSTRUCTION. (See 986.)

861. PATHOLOGY.

862. HYGIENE. PUBLIC HYGIENE AND SANITATION.
Hygienic chemistry.

863. INSTRUMENTS OF EXAMINATION AND APPARATUS OF GENERAL, LOCAL AND SPECIAL SURGERY. ANÆSTHETICS.
Instruments for physical diagnosis, clinical thermometers, stethoscopes, op-

866. DENTAL SURGERY AND DENTAL MECHANISM.
Operative dentistry.
False teeth and substitutes.
Office appliances, chairs, etc.

867. VETERINARY SURGERY AND MEDICINES.
(See also 180.)

868. PHARMACOLOGY, DRUGS, PHARMACY, ETC.
Medicines, official (in any authoritative pharmacopœia) articles of the materia medica, preparations, unofficial.
Pharmaceutical apparatus.

869. MISCELLANEOUS APPARATUS FOR THE USE OF THE SICK, INFIRM AND INSANE.
Accessory articles used in the medical, surgical, and pharmaceutical service of hospitals and infirmaries.
Vehicles and appliances for the transportation of the sick and wounded, on shore or at sea.

87. Public Convenience and Safety.

870. DEVELOPMENT OF PATERNAL AND PROTECTIVE RELATIONS OF GOVERNMENT TO PEOPLE.
Historical collections.

871. PUBLIC ACCOMMODATION BY ACT OF GOVERNMENT, OR UNDER ITS REGULATION.
Public highways—Roads and paths, streets, bridges, parks and squares.
Water supply—Public fountains and springs, "the town pump," domiciliary supply, public water privileges for industrial uses, reservoirs, aqueducts and their accessories, public baths and laundries.
Light supply (so far as regulated by the Government)—Street illumination, gas works and gasometers, electric-light plant. (For mechanical display, see 422 and 433.)
Transportation (so far as regulated by the Government)—Street passenger vehicles; railways and steamboats; common carriers; baggage and express; mail and messenger systems, not governmental; telegraphic and telephone service.

872. PROTECTIVE SUPERVISION.
Sanitary supervision—Vaccination and its enforcement. Isolation of contagious disease. Quarantine. Prevention and elimination of animal epidemics.
Food inspection: Treatment of adulterated foods. Inspection and analysis. Treatment of stale food substances. Regulation of abattoirs, mills, etc. Regulation of sale of horses. Protective devices.
Building inspection, etc.—Building regulations and inspection. Building drainage and plumbing. Fire regulations, fire escapes, etc.
Personal inspection—Color tests, etc., for transportation hands, etc. Professional examination for licenses.
Immigration—Reception, care and protection of immigrants. Statistics of enumeration.

873. PUBLIC AND DOMESTIC HYGIENE.
Appliances, instruments, and apparatus used in hygienic investigations.
Sanitary appliances and methods for dwelling houses, buildings, and cities. Direct renewal of air—heating, ventilating, lighting, in their relation to health. Conduits of water and sewage. Drains and sewers. Flushing tanks, hydraulic syphons, water-closets, public and private latrines. Sinks, night-soil apparatus, sanitary plumbing, walls, bricks, roofs, flooring, etc. Sanitary house decoration, non-poisonous paints and wall papers, floor coverings, washables, decorations, etc.

873. PUBLIC AND DOMESTIC HYGIENE—Continued.

Apparatus for carrying off, receiving and treating sewage. Slaughter-house refuse, city garbage.

Apparatus and methods for filtering water and cleansing water courses.

Apparatus intended for the prevention of infectious diseases. Methods, materials and instruments for purifying and destroying germs and disinfecting.

Meteorological instruments, such as are used in climatological investigations: Barometers, aneroids, thermometers, earth thermometers, thermometer stands, hygrometers, anemometers, air meters, rain gauges, automatic meteorological apparatus, sunshine reporters, evaporation gauges, ozone papers, ozonometers, etc.

Diagrams, models, and apparatus illustrative of (*a*) the climatal conditions prevailing in various parts of the world; (*b*) the relations between health and disease; (*c*) rainfall, percolation, evaporation and flow from ground; and (*d*) other subjects embraced by the exhibition.

874. HYGIENE OF THE WORKSHOP AND FACTORY. (Classification modified from that of the London Health Exhibition.)

Designs and models for improvements in the arrangements and construction of workshops, especially those in which dangerous or unwholesome processes are conducted.

Apparatus and fittings for preventing or minimizing the danger to health or life from carrying on certain trades: Guards, screens, fans, air jets, preservative solutions, washes, etc.

Objects of personal use: Mouthpieces, spectacles, dresses, hoods, etc., for use in certain unhealthy and poisonous trades.

Illustrations of diseases and deformities caused by unwholesome trades and professions. Methods of combating these diseases. Preservative measures, etc.

Sanitary construction and inspection of workshops, factories and mines. New inventions or improvements for ameliorating the condition of life of those engaged in unhealthy occupations. Means for economizing human labor in various industrial operations.

Literature, statistics, diagrams, etc.

875. HYGIENE OF THE SCHOOL-ROOM.

Designs and models of improved buildings for elementary schools, infant schools, and crèches.

Apparatus and fittings for warming, ventilating and lighting schools, school latrines, closets, etc.

Special school fittings for storing and drying clothing.

School kitchens and arrangements for school canteens. Methods of warming children's meals, etc.

Precaution in schools for preventing the spread of infectious diseases, school sanitaria, infirmaries, etc.

Special apparatus for physical training in schools, gymnasia; apparatus for exercise, drill, etc.

Literature, statistics, diagrams, etc., relating to school hygiene.

876. LIFE-SAVING.

Life-saving at fires and prevention of fire.

Means for rendering materials incombustible, and for preventing the spontaneous combustion of coal. Fire-proof rooms and safes. Fire alarms and alarm systems. Fire indicators. Apparatus and chemical substances for giving alarms. Fire engines. Firemen's equipments. Fire escapes.

Lightning conductors.

Safety from floods—appliances for indicating a rise in the water of rivers.

876. LIFE-SAVING—Continued.

Safety from explosions—storing and transportation of explosive gases and inflammable substances. Gas-escape indicators. Alarm signals, feed appliances, and pressure gauges for preventing boiler explosions. Fire-damp indicators and safety lamps for miners.

Safety from accidents of land transportation—Brakes for horse vehicles. Railway signals, level crossings, automatic couplers. Precaution against color blindness.

Safety from accidents of water travel—Light-house systems. Vessel signals. Fog signals. Life-preservers, buoys. Appliances and organization of life-saving service.

Safety from rabid or venomous animals.

Relief of victims of accidents—relief of victims of suffocation. Relief of those apparently drowned. Relief of those who have taken poison. Treatment of cuts, bruises, and fractures. Aids of sick and injured.

Transport: By human agency—stretchers, litters, dhoolies, palanquins, handcarts. By animal traction—for accidents and injury, for infectious diseases, for ordinary sickness. By mechanical means—railway carriages for sick and injured, water carriage. Treatment (with appliances)—(*a*) shed hospitals for infectious fevers and epidemic diseases; (*b*) tent hospitals; (*c*) hospital ships; (*d*) furniture and fittings for sick rooms.

Aid to sick and wounded in war. Transport: (*a*) By human agencies—stretchers, litters, dhoolies, palanquins, handcarts, stretchers on wheels; (*b*) by animal traction—mule litters and chairs, camel and elephant litters, wheel carriages; (*c*) by mechanical means—railway ambulances, ship or water carriage. Treatment (with portable appliances and portable drugs)—(*a*) on the field; (*b*) in shed hospitals; (*c*) in tent hospitals. Naval and military hygiene.

877. PUBLIC CHARITIES.

Asylums—instruction and care of the defective classes. Blind asylums Deaf and dumb asylums. (Plans, furniture, etc.)

Reformatory institutions—Inebriate asylums. Magdalen asylums. Créches or day nurseries.

Orphan asylums. Foundling asylums. Children's aid societies.

Insane asylums.

Homes for the destitute, aged and infirm, for the maimed and deformed, soldiers' homes.

Emergency and lying-in, convalescent, and other hospitals. (From non-medical standpoint.)

Treatment of paupers—Almshouses, feeding the poor, lodging houses.

Emigrant aid societies.

Treatment of aborigines.

Prevention of cruelty to animals.

88. Government and Law. The Art of War.

880. HISTORY OF ADMINISTRATION AND GOVERNMENTAL INSTITUTIONS.

Primitive systems. Governments of primitive people.

Evolution of monarchial systems.

Evolution of representative systems. The town meeting, the hustings, etc., in America.

Literature, etc.

Maps showing graphically the geographical distribution of governmental systems, past and present.

Municipal government.

881. POPULAR PARTICIPATION IN GOVERNMENT.

Choice of rulers. Primitive methods. Successions and dynasties.

Ballot systems. All accessories of the ballot and voting. Voting machines.

882. LAW AND JUSTICE. (A suggestion.)

Legal codes. Retrospective collections. Legal codes of Babylonia. The Jews. India, Greece, Rome, shown by casts, fac-similes, and books. Documents in the history of English law. American law. Louisiana (civil or Roman law). Pacific coast and New Mexico. Literature.

The court. The judge. Usages and customs. Costume. The jury. Methods of polling. Arrangement of the hall of justice and its furniture. Literature. Pictorial illustrations and models. Customs of special courts.

The legal profession in all its ramifications. Lawyers in court and other professional relations. Costumes. Special residences (Inns of Court, the Temple, etc.). Pictures, portraits, literature.

Laws of individuals. Master and servant. Husband and wife (forms of papers relating to marriage and divorce). Parent and child. Guardian and ward. Orphans' court. Chancery.

Bonds and agreements. Methods of signing, sealing, and delivering paper.

Oaths and affidavits. Papers and other literature illustrating legal forms and methods of procedure. Writs (habeas corpus, ejection, etc.).

Police and police systems—Organization of local police. Costumes and weapons and other equipments, patrol wagons and wagons for transporting prisoners.

Detectives and systems of detective work.

Prisoners and malefactors—Statistics of crime. Criminal genealogy as shown by family trees of noted criminal families.

Portraits of criminals—Rogues' galleries. Thumb-mark identification. Composite portraits of special criminal groups, showing characteristic physiognomy of special crime tendencies.

Characteristics of the different kinds of lawbreakers—Implements and accessories. Weapons. Costumes and disguises.

Gamblers and gambling—Dens and halls. Implements and accessories of faro, rouge-et-noir, etc.

Burglary and theft—Forgery, etc. Pickpockets. Implements of housebreaking. Highway robbery. Sneak theft.

Counterfeiting—Tools and products in metal and paper. Altered coins and notes.

Murder and violence—Fights. The duel and its history.

Dissipation—Drunkenness. Opium and hasheesh.

Vagrancy and disorder—Riots. Bombs and dynamite.

Cruelty to animals. Illustrations of cruel methods. Societies for prevention of cruelty to animals.

Administration of justice.

Arrest—Manacles and handcuffs.

Punishments—History. Stocks. Ducking stool and whipping post in America. Historical collections.

882 *a*. INTERNATIONAL LAW.

Sovereignty over seas—Ministers, diplomatic agents, consuls, forms, passports, certifications, etc. Features. Fac-similes of important treaties. Photographs, etc., of important diplomatic meetings (Berlin Congress, *e. g.*). Naturalization. Extradition. Allegiance and citizenship.

883. PRISONS AND REFORMATORIES.

Buildings, plans, and pictures of exteriors and interior arrangements. Cells.

Prisons of all lands and times. Historical collections.

Dress and personal equipment of prisoners. Prison dietaries.

883. PRISONS AND REFORMATORIES—Continued.
Convict labor—in confinement, and in confinement and outside gangs. Convict labor leases. Examples of convict workmanship.
Prison discipline, instruction, and reform.
Reform schools and houses of detention.
Punishment at sea.

884. GOVERNMENT BUILDINGS.
National, state and provincial capitals. Pictures and plans. Executive dwellings. Palaces. Administrative offices. City and town halls. Custom and post offices. Public edifices of all kinds and all lands, not elsewhere classified.

885. TAXES AND CUSTOMS AND THEIR ADMINISTRATION.
Tax systems. Historical collections. Literature and statistics.
Tax collecting. Assessment.
The custom-house—appraisement. Collection of duties. Inspection of goods and baggage of passengers. Bonded warehouses. Systems of administration. Plans and pictures. Bonded distilleries.
The Revenue-Marine Service—revenue cutters. Revenue officers.
Smuggling—methods. Devices for concealment about person and otherwise. Curiosities of smuggling.
Illicit manufactures—distilleries, etc. Moonshiners and their methods.

886. ARMIES AND NAVIES.
The military class in all lands in the past. Historical collections. Pictures.
Military costumes and accoutrements.
Costume and accoutrement of naval forces—marines.
Arms of all kinds (ordnance excepted), with all accessories.
Dietaries. Camp equipment and material.
Recruiting, and its methods.
Asylums and pension systems.
Militia—national guard, landwehr, etc. Illustrations of methods of organization. Collective exhibits for special localities.
Campaign and battles. Plans and pictures of engagements by land and sea in all lands. Historical collections, literature and relics.
Military and naval leaders and heroes. Portraits and biography. Personal relics.

886*a*. MILITARY ENGINEERING, ORGANIZATION AND ACCESSORIES.
Retrospective collections.
Fortifications. Coast and river defenses, not aquatic.
Heavy ordnance and projectiles, and all accessories.
Light artillery, composing guns, machine guns, mitrailleuses.
Military small arms, muskets, pistols and magazine guns.
Ammunition and its accessories.
Military topography and geography.
Systems of transport. Trains and wagons. Pontoons and bridges.
Camps, tents and barracks.
Arsenals and armories.
Clothing and supplies. Food.
Systems of organization. Composition of armies. Officers.
Systems of tactics.

887. THE ART OF NAVAL WARFARE.
Retrospective collections. War ships of all nations. Pictures, plans and models.
The modern war ship. Armored cruisers. Torpedo boats.
Ordnance and projectiles for naval use. Ammunition, etc.
Economy of ship life as modified for military purposes.

stones, bolas, sling boards and darts.
Bows and arrows, cross bows, blowguns and arrows, sumpitans.
Catapults, balistas, spring guns.
Fire-arms and projectiles.
Armor of personal defense—Shields, helmets, suits of armor.

888. THE GOVERNMENT OF THE UNITED STATES.
(See collective exhibit.)

888*a*. THE STATE GOVERNMENTS.
Similar exhibits arranged by States.

889. FOREIGN GOVERNMENTS.
Resources and powers of other governments arranged in a similar manner.

89. Societies and Federations.

890. BANDS AND LEAGUES OF PAST TIMES.

891. BENEVOLENT SOCIETIES.
Humane and life-saving societies.
Early bands and leagues.

892. COÖPERATIVE ASSOCIATIONS.

893. INSURANCE AND MUTUAL BENEFIT SOCIETIES.

894. TRADE UNIONS, ETC. INDUSTRIAL ORGANIZATIONS.

895. PATRIOTIC SOCIETIES.
Military organizations and orders.

896. LITERARY SCIENTIFIC AND HISTORICAL SOCIETIES.

897. SOCIAL ORGANIZATIONS.
Clubs and club houses.

898. POLITICAL SOCIETIES AND ORGANIZATIONS.

899. SECRET ORDERS AND FRATERNITIES.

DEPARTMENT 9.—SCIENCE, RELIGION, EDUCATION AND HUMAN ACHIEVEMENT.

90. Institutions and Organizations.

904. Scientific Societies, devoted to Limited Subjects.
Mathematical, astronomical, chemical, geological, geographical, zoölogical, botanical, ethnological, philological, etc.

905. Educational Societies and Organizations.
Government Educational Board.
Societies, etc.

906. Publication Societies.
Society for the Promotion of Christian Knowledge, etc.

907. Professional Societies.
Engineering, military, legal, medical, dramatic, etc.

908, 909. Other Organizations.

91. Science and Philosophy.

910. History of Science and Philosophy.
Portraits and memorials of philosophers and scientific investigators.

911. Methods of Investigation.
Mathematics—Arithmetic, algebra, geometry, trigonometry, analytical geometry, calculus.
Physics—Mechanics, statics, dynamics, molecular physics, liquids, gas, sound, light, heat, electricity, magnetism.
Astronomy—Solar system, sun, moon, planets, stars, meteors, comets, earth, geodesy, etc. Chronology.
Chemistry—Inorganic and organic. Mineralogy and crystallography.
Geology—Physical and dynamic. Meteorology.
Biology—Zoölogy, botany, physiology, paleontology.
Anthropology and ethnology—Philology.
Sociology and history—Political economy and statistics. Governmental institutions.
Geography and physiography in general—Maps and atlases, geographical, topographical, hydrographical and astronomical. Relief maps. Economic geography.

912. Instruments of Precision for Test and Record of Space, Distance, Dimensions, Quantity and Capacity, Form and Direction.
Scales of length—Standards of length compared. Accessories to scales of length, as calipers, verniers, micrometers, micrometric screws, dividing machines.
Quantity and capacity tests—Measures, gauges, for barrels, tonnage and cordage tests. Gas and water meters. Tell-tales, indicators, etc. Gaugers' tools.
Pedometers, odometers, viameters, perambulators, etc.
Geodetic and surveying instruments—Theodolites, transits, needle compasses, base apparatus, etc., and other appliances for surveying, leveling, geodesy, topography. Instruments for underground surveys. Sounding apparatus.
Apparatus for astronomical observations—Transits, transit circles, zenith sections, equatorials, collimators, reflecting and repeating circles, heliostats and siderostats, bolometers, etc., and other apparatus used in observations.
Nautical astronomical instruments. Sextants, quadrants, repeating circles, dip-sections.
Form: Appliances for registry of form—Geometrical record (with models), clinometers, crystalometers. Facial-angle systems. Draftsmen's instruments, pantagraphs, etc. (See also Pictorial arts.)
Direction: Leveling instruments and apparatus—Carpenters' and builders' levels, land levels, water levels, engineers' levels.
Compasses and their variations.
Plumb lines.

913. INSTRUMENTS OF PRECISION FOR THE TEST OF FORCE, SPEED, ETC.

Weight and specific gravity: Standards of weights and their comparison—Scales, balances, steelyards, assay balances, and ordinary scales for heavy weights special finding.—Instruments to determine specific gravity and density—Hydrometers, aërometers, invariable pendulums, etc.

Speed: Tachymeters. Current meters, ships' logs, electrical logs.

Force: Dynamometers. Ganges for hydraulic, pneumatic and steam machinery.

Heat and other physical effects: Thermometers and other instruments to measure meteorological effects. Barometers, pyrometers, eudiometers, electrometers, rheometers, magnetometers, etc. (See also Meteorology, Class 926.)

Tone: Tuning forks and pipes.

Electrical apparatus: Friction machines. Condensers and miscellaneous apparatus to illustrate the discharge. Galvanic batteries and accessories to illustrate dynamical electricity. Electro-magnetic apparatus, induction machines, Ruhmkorff coils, etc. Magnets and magneto-electric apparatus.

914. INSTRUMENTS OF PRECISION.

Number, time, etc.

Number.

Tallies, automatic registers and abaci. Mathematical instruments. Calculating machines.

Time. (Horology.)

Ancient chronometry. Planetary motion. Dials, hour-glasses.

Modern chronometry—Clepsydra, clocks, weight, spring and balance, electric apd astronomical. Watches, chronometers, stop watches.

Almanacs, calendars and time-tables. Ephemerides.

Registration of musical time or length. Metronomes.

915. INSTRUMENTS ACCESSORY TO RESEARCH.

Comparative meteorology: Scales of weights and measures of different countries.

Instruments accessory to research: Microscopes and lenses and their accessories. Telescopes and lenses and their accessories. Apparatus for polarization, refraction, photometry, etc. Spectacles and eye-glasses, field and opera-glasses, graphoscopes and stereoscopes. Instruments for the investigation of the principal mediums of heat, light, electricity, etc. Spectroscopes and accessories for spectrum analysis. Polariscopes. Thermotic apparatus.

Instruments used in anatomical and physiological investigation.

Instruments used in chemical and assay work.

Tables of all kinds for use in computation.

916. METEOROLOGY.

Modern meteorology and weather forecasts. History and present methods.

Meteorological instruments. (See also Class 922.)

Barometers, hygrometers and rain gauges. Maps, bulletins. Blanks for reports. Methods of recording, reducing and reporting observations.

917. APPLIED SCIENCE.

Mechanical engineering.

Civil engineering.

Navigation.

Invention.

All other departments of applied sciences, literature, statistics, and full exhibition of methods and instruments not elsewhere shown.

918. LABORATORIES AND OBSERVATORIES.
A chemical laboratory in operation.
A physical laboratory in operation.
An astronomical observatory in operation.
An astrophysical laboratory in operation.
A biological laboratory in operation.
An anthropometrical laboratory in operation.
A taxidermist's workshop in operation.

919. SCIENTIFIC EXPLORATION.
History and literature. Maps. Portraits.
Relics of all great exploring expeditions of the past.
Methods and results of recent explorations.

92. History.

920. PREHISTORIC ARCHÆOLOGY.
America and Europe.*
Ethnographical collections, illustrating the life of primitive man and modern savages, with specimens of prehistoric habitations.

921. HISTORIC ARCHÆOLOGY.
Europe and Asia.

922. EARLY EUROPEAN HISTORY.
Especially England, Ireland, Scotland, Scandinavia, Germany, France, Italy, Spain and Portugal.

923. THE DISCOVERY OF AMERICA AND THE EARLY PERIOD OF EXPLORATION AND CONQUEST. THE COLONIZATION AND SUBSEQUENT HISTORY OF LATIN AMERICA.

924. THE COLONIAL PERIOD IN NORTH AMERICA.

925. THE PERIOD OF THE REVOLUTION AND OF THE ORIGIN OF THE GOVERNMENT OF THE UNITED STATES.

926. LATER HISTORY OF THE UNITED STATES, 1789–1892.

927. LATER HISTORY OF EUROPE, ETC.

928. BIOGRAPHY AND FAMILY HISTORY.
Portraits of representative men. Genealogical collections: Literature, pedigrees, heraldry, arms, private and public.

93. Books and Literature.

NOTE.—The classification is that of the Dewey Relative System, which may be used in detail to excellent advantage in many departments of the Exposition work.

930. GENERAL WORKS.
Cyclopedias, magazines and newspapers. Bindings. Specimens of typography.

931. PHILOSOPHY.

932. RELIGION.

933. SOCIOLOGY.

934. PHILOLOGY.

935. NATURAL SCIENCES.

936. USEFUL ARTS.

937. FINE ARTS.

938. LITERATURE.

939. HISTORY AND GEOGRAPHY.

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*An elaborate arrangement of this division has been prepared by Dr. Thomas Wilson, to which the attention of the commission is especially directed.

Plans, models, and pictures of exteriors and interiors. Interior fittings.
Furniture.
Decoration. Windows. Painting.
Vestments and other accessories of ecclesiastical costume.
Church plate, etc.

953. RELIGIOUS MUSIC.
Choirs. Hymnology.

954. ACCESSORIES OF PRIVATE DEVOTIONS.

955. CHARITABLE AND REFORMATORY WORK.
Church guilds, etc.

956. SPECIAL EDUCATIONAL WORK.
Systems and methods of religious instructions and training for the young.
Sunday schools, furniture and apparatus.
Associations for religious and moral improvement.
Academies and colleges under denominational control.

957. MISSIONS AND MISSIONARY WORK.
History of missions.
Maps, showing missions, past and present, in regard to geographical distribution.
Societies and organizations for the propagation of systems of religion by missionary efforts.
Spreading the knowledge of religious systems by publications.

958. THE BIBLE.
Versions in every tongue. Editions of all kinds.
The English Bible.
Bible societies. Colportage.

96. Education, Primary.

960. PRINCIPLES OF PRIMARY EDUCATION.
Literature, statistics and diagrams. Statistics as to the effects of "cramming" and overwork on the young, etc.

64. DOMESTIC AND INDUSTRIAL TRAINING FOR GIRLS.
Models and apparatus for teaching of cookery, housework, washing and ironing, needlework and embroidery, dressmaking, artificial flower making, painting on silk, crockery, etc. Specimens of school work.

965. HANDICRAFT TEACHING IN SCHOOLS FOR BOYS.
Apparatus and fittings for elementary trade-teaching in schools. Specimens of school work.

966. SCIENCE TEACHING.
Apparatus and models for elementary science instruction in schools. Apparatus for chemistry, physics, mechanics, etc. Diagrams, copies, text-books, etc. Specimens of the school work in these subjects.

967. ART TEACHING.
Apparatus, models and fittings for elementary art instruction in schools, text-books, etc. Diagrams, copies, text-books, etc. Specimens of art-work, modeling, etc., in schools.

968. TECHNICAL AND APPRENTICESHIP SCHOOLS.
Apparatus and examples used in primary and secondary schools for teaching handicraft. Models, plans and designs for the fitting up of workshop and industrial schools. Results of industrial work done in such schools.

969. EDUCATION OF DEFECTIVE CLASSES.
Deaf, dumb, blind schools, etc. Adult schools for the illiterate.

97. Education, Secondary. (Grammar School. High School. Seminary and Academy Gymnasium.)

971. SYSTEMS OF SCHOOLS (State, city and town).
Organization, gradings, discipline, etc.

972. BUILDINGS AND THEIR ARRANGEMENTS.
Sanitary condition. Furniture.

973. APPARATUS OF GENERAL INSTRUCTION.
Maps, globes, diagrams.

974. PHYSICAL TRAINING.
Gymnasium. Military drill. Summer camp.

975. TRAINING IN DRAWING, MUSIC, ETC.

976. TRAINING IN PHYSICAL SCIENCE.
Apparatus, laboratories, etc. Cabinets.

977. BOOKS.
Text-books and other appliances.

978. MANUAL, AGRICULTURAL AND INDUSTRIAL EDUCATIONS.
Commercial and trades schools.

979. EDUCATIONAL ORGANIZATIONS FOR ADULTS.
Polytechnic schools. Reading rooms. Institutions.
Chautauqua circles, etc.

98. Education, Superior.

980. THE COLLEGE AND THE UNIVERSITY.

981. SYSTEMS.
Curriculum, admission requirements, examination.

982. BUILDINGS.

983. APPARATUS, ETC.

984. THE COLLEGE.

985. THE UNIVERSITY AND POSTGRADUATE COURSES.
University extension, etc.

986. PROFESSIONAL SCHOOLS.
Art and design.
Music.

986. PROFESSIONAL SCHOOLS—Continued.
Mining and metallurgy. Engineering.
Military and naval.
Medicine and surgery. Veterinary medicine. Pharmacy.
Law.
Theological.
Normal.
987. THE LYCEUM, ETC.
Lectures.
988. PUBLIC MUSEUMS AND EXPOSITIONS.
989. THE PUBLIC LIBRARY.

99. Human Achievement. The Greatest and the Best.

The arrangement of the division is not worked out, but in proper hands the possibilities of interest in this direction are almost limitless. Among the suggestions are the following:

The great men and women of the world. Portraits, etc. (No one living to be admitted.)
Great works of art:
Copies of the greatest paintings—not to exceed one hundred.
Copies of the greatest sculptures—not to exceed twenty-five.
Copies of the greatest crayons and etchings—not to exceed twenty-five.
Models and pictorial reproductions of the greatest buildings of the world—not to exceed twenty-five.
The greatest books.
The greatest industrial and economical discoveries and inventions. The invention of printing, gunpowder, the telescope, the railway, vaccination, the circulation of the blood, photography, fish culture, etc.
A special display ought to be made of great American discoveries—the steamboat, the telegraph, the telephone, the lightning rod, the cotton gin, the reaper, the sewing machine, anæsthetics, etc.

Actual reproductions of Old World monuments to commemorate historic personages and events might well be shown.

DEPARTMENT 10.—COLLECTIVE AND MONOGRAPHIC EXHIBITS.

100. Collective Exhibits.

101. FOREIGN GOVERNMENTS. COLLECTIVE EXHIBITS.
As is the universal practice in international exhibitions, foreign commissioners will expect to install their material collectively, making exceptions, possibly, in the matter of machinery in motion, agricultural products and living animals, and the fine arts. For convenience of the juries they will, of course, conform as nearly as may be to the official classification, within the limits of the space assigned to each country.
If the plan proposed by Mr. W. E. Curtis is accepted, a special building will be required for the combined collective exhibit of the Spanish-American Republics.
102. THE GOVERNMENT OF THE UNITED STATES. COLLECTIVE EXHIBIT OF THE GOVERNMENT DEPARTMENTS.
103. AMERICAN STATES AND CITIES.
State and city buildings, and their contents.
104. THE WOMAN'S DEPARTMENT.

105. COLLECTIVE EXHIBITS. ISOLATED BY THE BOARD OF MANAGEMENT FOR REASONS OF CONVENIENCE.

Machinery in motion. (See detailed classification under Division 40.)
Electricity and magnetism, and their applications.
Pomological exhibitions.
Horticultural displays in the open air.
Live-stock exhibitions, etc.
Agricultural machinery at work.
Waste products and their utilization.
Athletic contests and games. Angling tournaments, rifle practice, etc.
Military displays and competitive drills.
Fire companies and competitive contests.
Pyrotechnic competitions.

106. SPECIAL INDUSTRIES. COLLECTIVE EXHIBITS.

As in other exhibitions, organizations representing great industrial interests will desire to erect and maintain buildings for special collective exhibits—*e. g.*, the brewing industry, the leather industries, the textile industry, etc.

107. AMERICAN ETHNOGRAPHY AND THAT OF OTHER COUNTRIES.

Special monographic exhibit of the tribes of American aborigines. Similar collections from other lands.
Villages or families of various primitive peoples engaged in their native occupations.

108. SPECIAL MONOGRAPHIC EXHIBITS SHOWING THE CIVILIZATION OF COUNTRIES WHICH HAVE CONTRIBUTED LARGELY TO THE PEOPLING OF AMERICA.

109. OTHER COLLECTIVE EXHIBITS.

SECTION IV.

BIBLIOGRAPHY OF THE U. S. NATIONAL MUSEUM FOR THE FISCAL YEAR ENDING JUNE 30, 1891.

BIBLIOGRAPHY OF THE U. S. NATIONAL MUSEUM, 1891.

I.—PUBLICATIONS OF THE MUSEUM.

ANNUAL REPORTS.

Annual Report | of the | Board of Regents | of the | Smithsonian Institution, | showing | the Operations, Expenditures, and Condition | of the Institution | for the | year ending June 30, 1888. | —— | Report of the U. S. National Museum. | —— | Washington: | Government Printing Office. | 1890.

8vo., pp. xxii+876. 110 plates, 514 text figures, and 3 maps.

PROCEEDINGS.

Smithsonian Institution. | United States National Museum. | —— | Proceedings | of the | United States National Museum. | —— | Vol. XII. | 1889. | —— | Washington: | Government Printing Office. | 1890.*

8vo., pp. viii+686. Plates I–XXIII, figures 14.

During the year the following papers, constituting Volume XIII, were issued separately, although the bound volume itself had not appeared at the close of the fiscal year.

Date of publication.	No. of publication.	Pages.	Date of publication.	No. of publication.	Pages.
1890.			1890—Continued.		
July 1	790	1–2	September 9	803	157–160
July 1	791	3–4	September 9	804	161–164
July 18	792	5–12	September 9	805	165–170
July 22	793	13–14	September 9	806	171–172
September 9	794	15–35	September 9	807	173–175
July 1	795	37–45	September 9	808	177–182
July 1	796	47–48	September 9	809	183–185
July 1	797	49–126	September 9	810	187–194
July 1	798	127–130	September 9	811	195–196
September 9	799	131–142	September 9	812	197–203
September 9	800	143–144	September 16	813	205–225
September 9	801	145–149	September 16	814	227–229
September 9	802	151–155	September 16	815	231–234

* The announcement of the publication of Vol. XII is also given in the Report for 1890. This error was caused by incorrect notification of the date of receipt of the edition at the National Museum.

Date of publication.	No. of publication.	Pages.	Date of publication.	No. of publication.	Pages.
1890—Continued.			1891.		
October 14	816	235–238	April 8	829	313–336
October 14	817	239–242	April 8	830	337–345
October 14	818	243–248	April 18	831	347–352
October 14	819	249–265	April 8	832	353–354
October 14	820	266–279	April 18	833	355–360
December 31	821	281–285	May 8	834	361–376
November 15	822	287–288	May 8	835	377–380
November 15	823	289–290	May 29	836	381–382
November 15	824	291–298	May 6	837	383–396
December 11	825	299–302	April 18	838	397–405
November 15	826	303–304	May 8	839	407–447
November 15	827	305–308	May 29	840	449–455
November 15	828	309–311	May 29	841	457–643

II.—PAPERS BY OFFICERS OF THE NATIONAL MUSEUM AND OTHER INVESTIGATORS, WHOSE WRITINGS ARE BASED DIRECTLY OR INDIRECTLY ON THE COLLECTIONS OF THE MUSEUM.

ALPHABETICAL LIST OF NAMES.

Adler, Cyrus, Johns Hopkins University, Baltimore, Md., Assistant Curator, Section of Oriental Antiquities, U. S. National Museum.

Allen, Harrison, 1933 Chestnut Street, Philadelphia, Pa.

Anthony, A. W., 2042 Albatross Street, San Diego, Cal.

Baur, G., Clark University, Worcester, Mass.

Bean, Barton A., Assistant Curator, Department of Fishes, U. S. National Museum.

Bean, Tarleton H., U. S. Fish Commission; Honorary Curator, Department of Fishes, U. S. National Museum.

Bendire, Charles E., U. S. Army; Honorary Curator, Department of Birds' Eggs, U. S. National Museum.

Brewster, William, Cambridge, Mass.

Cherrie, George K., Museo Nacional de Costa Rica, San José, Costa Rica.

Clark, A. Howard, Curator of Historical Collections, U. S. National Museum.

Clarke, F. W., U. S. Geological Survey; Honorary Curator, Department of Minerals, U. S. National Museum.

Collins, G. N., Syracuse, N. Y.

Collins, Joseph William, U. S. Fish Commission; Honorary Curator, Sections of Fisheries and Naval Architecture, U. S. National Museum.

Cook, O. F., Syracuse, N. Y.

Cory, Charles B., 8 Arlington Street, Boston, Mass.

Coulter, John Merle, Indiana State University, Bloomington, Ind.

Dall, William Healey, U. S. Geological Survey; Honorary Curator, Departments of Mollusks and Cenozoic Fossils, U. S. National Museum.

Dana, Edward S., Yale University, New Haven, Conn.

Dewey, Frederic Perkins, Washington, D. C.

Dutcher, William, 51 Liberty Street, New York City.

Evermann, Barton Warren, Indiana State Normal School, Terre Haute, Ind.

Fisher, A. K., U. S. Department of Agriculture, Washington, D. C.

Flint, James M., U. S. Navy.

Fontaine, W. M., University of Virginia, Virginia.
Forbes, S. A., Illinois State University, Champaign, Ill.
Gilbert, Charles H., Leland Stanford Junior University, Palo Alto, Cal.
Gill, Theodore, Smithsonian Institution.
Gurney, John Henry, Norwich Hall, Norwich, England.
Hargitt, Edward, 1 Bedford Road, Bedford Park, London, England.
Hasbrouck, Edwin M., 1610 Fifteenth street, northwest, Washington, D. C.
Hay, O. P., Terre Haute, Ind.
Hitchcock, Romyn, Washington, D. C.
Holm, Theodor, U. S. National Museum.
Holmes, William H., Bureau of Ethnology; Honorary Curator, Department of American Aboriginal Pottery, U. S. National Museum.
Hough, Walter, Department of Ethnology, U. S. National Museum.
Howard, L.O., Assistant Entomologist, U. S. Department of Agriculture, Washington, D. C.
Jordan, David Starr, President of Leland Stanford Junior University, Palo Alto, Cal.
Knowlton, F. H., Assistant Curator, Department of Fossil Plants, U. S. National Museum.
Koehler, S. R., Curator, Section of Graphic Arts, U. S. National Museum.
Lawrence, George N., New York, N. Y.
Lesquereux, Leo, Columbus, Ohio.
Lockhart, J. G.
Loomis, Leverett M., Chester, S. C.
Lucas, F. A., Assistant Curator, Department of Comparative Anatomy, U. S. National Museum.
Marlatt, C. L., U. S. Department of Agriculture, Washington, D. C.
Mason, Otis T., Curator, Department of Ethnology, U. S. National Museum.
Mearns, Edgar A., Assistant Surgeon, U. S. Army, Fort Snelling, Minn.
Merriam, C. Hart, U. S. Department of Agriculture, Washington, D. C.
Merrill, George P., Curator, Department of Geology, U. S. National Museum.
Nelson, E. W., U. S. Department of Agriculture, Washington, D. C.
Palmer, William, Chief Taxidermist, U. S. National Museum.
Prosser, Charles S., U. S. Geological Survey, Washington, D. C.
Proudfit, S. V., U. S. Department of the Interior, Washington, D. C.
Rathbun, Richard, U. S. Fish Commission; Honorary Curator, Department of Marine Invertebrates, U. S. National Museum.
Ridgway, Robert, Curator, Department of Birds, U. S. National Museum.
Riker, Clarence B., New York City, N. Y.
Riley, Charles V., Entomologist, U. S. Department of Agriculture; Honorary Curator, Department of Insects, U. S. National Museum.
Rose, Joseph Nelson, U. S. Department of Agriculture, Washington, D. C.
Schneider, E. A., U. S. Geological Survey, Washington, D. C.
Shufeldt, R. W., U. S. Army, Takoma Park, D. C.
Simpson, Charles Torrey, U. S. National Museum.
Smith, Hugh M., U. S. Fish Commission, Washington, D. C.
Smith, John B., Rutgers College, New Brunswick, N. J.
Stearns, Robert E. C., Adjunct Curator, Department of Mollusks, U. S. National Museum.
Stejneger, Leonhard, Curator, Department of Reptiles and Batrachians, U. S. National Museum.
Tanner, Lieut. Commander Z. L., U. S. Navy, commanding U. S. Fish Commission steamer *Albatross*.
Thompson, Ernest E., 20 St. Bride Street, Ludgate Circus, London, England.
Townsend, Charles H., Naturalist, U. S. Fish Commission steamer *Albatross*.
True, Frederick W., Curator, Department of Mammals, U. S. National Museum.

CHARLES E. BENDIRE. Report on the Section of Birds' Eggs in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 151, 152.

WILLIAM BREWSTER. A new subspecies of the Solitary Sandpiper.

The Auk, VII, October, 1890, pp. 377-379.

Totanus solitarius cinnamoneus, Cinnamon Solitary Sandpiper, p. 377, Lower California.

WILLIAM BREWSTER. Descriptions of seven supposed new North American birds.

The Auk, VIII, April, 1891, pp. 137-149.

(1) ***Megascops asio aikeni***, p. 139, El Paso County, Colo.; (2) ***Megascops asio macfarlani***, p. 140, Fort Walla Walla, Wash.; (3) ***Megascops asio saturatus***, p. 141, Victoria, British Columbia; (4) ***Contopus richardsonii peninsulæ***, p. 144, Sierra de la Laguna, Lower California; (5) ***Ammodramus henslowii occidentalis***, p. 145, Moody County, Dak.; (6) ***Pipilo maculatus magnirostris***, p. 146, Sierra de la Laguna, Lower California; (7) ***Vireo solitarius lucasanus***, p. 147, San Jose del Rancho, Lower California; (8) ***Sitta carolinensis lagunæ***, p. 149, Sierra de la Laguna, Lower California.

GEORGE K. CHERRIE. Description of a supposed new *Myrmeciza*.

The Auk, VII, April, 1891, pp. 191-193.

Myrmeciza immaculata occidentalis from Pozo Azul, Costa Rica.

A. HOWARD CLARK. Report on the collection of historical relics, coins, medals, etc., in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 115, 116.

F. W. CLARKE. An account of the progress of chemistry for the years 1887 and 1888.

Report of the Smithsonian Institution, 1888 (1890), pp. 425–453.

F. W. CLARKE. On the question of concordance in atomic weight determinations.

Amer. Chem. Jour., XIII, No. 1, January, 1891, pp. 34–42.

F. W. CLARKE. Table of atomic weights.

Issued as a circular by the Committee of Revision and Publication of the Pharmacopœia of the United States of America, December 6, 1890.

F. W. CLARKE. The unit of atomic weights.

Pharmaceutische Rundschau (New York), IX, No. 5, May, 1891, pp. 108–110.

(Published in parallel columns with a German translation by F. Hoffmann.)

F. W. CLARKE. (Editorially.) Abstracts of researches on atomic weights.

Journal of Analytical and Applied Chemistry.

(Several papers published in different numbers of the magazine.)

F. W. CLARKE. Report on the Department of Minerals in the U. S. National Mu-

JOSEPH WILLIAM COLLINS. Introduction (to a review of the fisheries of the Great Lakes in 1885).

Report of the U. S. Commissioner of Fish and Fisheries, XV, 1887 (1891), pp. 7–17.

JOSEPH WILLIAM COLLINS. Vessels and boats employed in the fisheries of the Great Lakes.

Report of the U. S. Commissioner of Fish and Fisheries, XV, 1887 (1891), pp. 19–29, pl. I-X.

JOSEPH WILLIAM COLLINS. The fishing craft of the world.

Harpers' Weekly (Supplement), August 16, 1890.

O. F. COOK and G. N. COLLINS. Notes on North American *Myriapoda* of the family *Geophilidæ*, with descriptions of three new genera.

Proc. U. S. Nat. Mus., XIII, No. 837, May 6, 1891, pp. 383–396, pl. XXXIII–XXXV.

CHARLES B. CORY. On the West Indian species of the genus *Certhiola*, or *Cæreba*.

The Auk, VIII, January, 1891, pp. 37–41.

J. M. COULTER. Manual of the *Phanerogams* and *Pteridophytes* of western Texas.

Contributions from the U. S. National Herbarium, II, No. 1, June 27, 1891, pp. 1–152. (With index.)

This contribution is Part I of a manual for western Texas, and includes the *Polypetalæ*. It begins with an analytical key to the orders, followed by similar keys to the families. The number of genera enumerated and described is 270, and of the species 761. *Thelypodium Vaseyi*, n. sp., is figured.

J. M. COULTER and J. N. ROSE. *Actinella Texana*, n. sp.

Botanical Gazette, XVI, 1891, p. 27.

A description of a peculiar species of *Actinella* from Texas.

J. M. COULTER and J. N. ROSE. *Coursetia Axillaris*, n. sp.

Botanical Gazette, XVI, 1891, p. 180.

This is a description of a new *Coursetia* from Texas, recently collected by Mr. G. C. Nealley.

J. M. COULTER and J. N. ROSE. Notes on North American *Umbelliferæ*.

Botanical Gazette, XV, 1890, pp. 259–261.

This paper consists chiefly of a report on Captain John Donnell Smith's Guatemalan collection. One new species is described, *Arracacia Donnell-Smithii*.

WILLIAM HEALEY DALL. Mount St. Elias.

Science, XVI, No. 406, November 14, 1890, pp. 275.

Discussion of methods and results of mountain measurement, especially the Coast Survey measurement of Mount St. Elias.

WILLIAM HEALEY DALL. Mount St. Elias (II.)

Science, XVI, No. 408, November 28, 1890, p. 303.

Reply to letter of Prof. Heilprin, continuing the discussion.

WILLIAM HEALEY DALL. Prof. Hilgard.

The Nation, LII, No. 1350, May 14, 1891, pp. 398, 399.

Biographical notice; subsequently reprinted in the *New York Evening Post*.

WILLIAM HEALEY DALL. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. No. XX. On some new or interesting west American shells obtained from the dredgings of the U. S. Fish Commission steamer *Albatross* in 1888, and from other sources.

Proc. U. S. Nat. Mus., XIV, No. 819, June, 1891, pp. 172–192, plates V-VII.

Description of *Cancellaria Crawfordiana*, *Tellina Idæ*, *Trophon cerrosensis*, *Terebratella occidentalis* var. *obsoleta*, *Buccinum strigillatum*, *B. taphrium*, *Mohnia Frieli*, *Strombella Middendorffi*, *S. fragilis*, *S. melonis*, *Chrysodomus ithius*, *periscelidus*, *phœniceus*, *eucosmius*, *hypolispus*, *acosmius* and *halibrectus*, *Trophon scitulus* and *disparilis*, *Puncturella major*, *Solemya Johnsoni*, *Cryptodon bisectus*; *Calyptogena*, a new genus of *Carditidæ*, with the new and typical species *C. pacifica*; and *Limopsis vaginatus*. Besides describing new species, the American species of *Eupleura* are reviewed and illustrated, the adult *Trophon triangulatus* first described and figured. The young of the same and *Tellina denticulata* Deshayes are for the first time figured, as are also the types of *Fusus Kobelti* Dall, *F. Harfordi* Stearns, various species of *Eupleura* and *Clementia subdiaphana* of Carpenter.

WILLIAM HEALEY DALL. Deep Sea Mollusks and the conditions under which they exist. An address delivered at the ninth anniversary meeting of the Biological Society of Washington, by William Healey Dall, President of the Society.

Proc. Biol. Soc. of Washington, V, July, 1890, pp. 1–122, (8vo.; advance copies, with title and cover.)

WILLIAM HEALEY DALL. A critical review of Bering's first expedition, 1725–'30, together with a translation of his original report upon it. With a map.

National Geographic Magazine, ii, No, 2, pp. 1–59, map, August, 1890. (Extra copies with title on cover).

This is a lecture delivered before the National Geographic Society at Washington, Feb. 7, 1890.

WILLIAM HEALEY DALL. Prof. Baird in Science.

Report of the Smithsonian Institution, 1888 (1890), 8vo., pp. 731-738.

Reprint from the proceedings of the memorial meeting of the scientific societies of Washington, January 11, 1888.

WILLIAM HEALEY DALL. Conchological notes from Oregon.

The Nautilus, iv, No. 8, Dec., 1890, pp. 87-89.

Miscellaneous notes on recent and fossil mollusks and description of the Pliocene *Mytilus Condoni* of Oregon.

WILLIAM HEALEY DALL. Description of a new species of Hyalina.

The Nautilus, v, May, 1891, pp. 10, 11.

This is a reprint from *Proc. U. S. Nat. Mus.*, xi, p. 214, 1888. The species is *Hyalina Sterkii* Dall.

WILLIAM HEALEY DALL. Notes on some recent brachiopods.

Proc. Acad. Nat. Sciences for 1891, pp. 172–175, pl. iv.

Refers to *Terebratella transversa*, *T. occidentalis*, *Eudesia lenticularis*, and *Megerlia monstruosa*, as well as some related species.

WILLIAM HEALEY DALL. Elevation of America in the Tertiary period.

Geol. Mag., n. ser., Decade iii, vol. viii, June, 1891, pp. 287, 288.

WILLIAM HEALEY DALL. Description of a new species of land-shell from Cuba—*Vertigo Cubana*.

Proc. U. S. Nat. Mus., xiii, No. 790, July 1, 1890, pp. 1, 2.

WILLIAM HEALEY DALL. Report on the Department of Mollusks (including Tertiary fossils) in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 159–164.

WILLIAM HEALEY DALL and H. A. PILSBRY. On some Japanese brachiopoda, with a description of a species believed to be new.

Proc. Acad. Nat. Sci., May, 1891, pp. 165–171, pl. iv.

Describes *Terebratula Stearnsii*; the adult stage, heretofore unknown, of *Terebratella Gouldii* Dall, described in the *Magasella* stage originally; enumerates the identified stages of North Pacific brachiopods; and notes the occurrence in Japan of several well-known species.

WILLIAM HEALEY DALL and H. A. PILSBRY. *Terebratulina (unguicula Cpr. var.) Kiiensis*, Dall and Pilsbry.

Nautilus, v, No. 2, June, 1891, pp. 18, 19, pl. i.

Describes large variety (found both in Japan and California) of Carpenter's *Terebratula unguicula*.

EDWARD S. DANA. Mineralogy for 1887 and 1888.

Report of the Smithsonian Institution, 1888 (1890), pp. 455–473.

F. P. DEWEY. Report on the Department of Metallurgy and Economic Geology in in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 209–211.

WILLIAM DUTCHER. The Labrador Duck.—A revised list of the extant specimens in North America, with some historical notes.

The Auk, viii, April, 1891, pp. 201–216.

BARTON WARREN EVERMANN.

(See under DAVID STARR JORDAN.)

A. K. FISHER. Notes on the occurrence of a young crab-eater (*Elacate canadensis*) from the Lower Hudson Valley, New York.

Proc. U. S. Nat. Mus., xiii, No. 811, September 9, 1890, p. 195.

JAMES M. FLINT. Report on the Section of Materia Medica in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), p. 113.

W. M. FONTAINE and F. H. KNOWLTON. Notes on Triassic plants from New Mexico.
Proc. U. S. Nat. Mus., XIII, No. 821 December 31, 1890, pp. 281-285, plates xxii-xxvi.
Description of locality and determination of fossil wood by F. H. Knowlton, and description of other plants by W. M. Fontaine. Nine species are enumerated, of which three (*Equisetum Abiquiense*, *E. Knowltoni*, and *Zamites Powelli*) are new to science.

S. A. FORBES. Preliminary Report upon the Invertebrate Animals inhabiting Lakes Geneva and Mendota, Wisconsin, with an account of the fish epidemic in Lake Mendota in 1884.
Bull. U. S. Fish Comm., VIII, 1888 (1890), pp. 473-487, plates LXXII-LXXIV.

CHARLES H. GILBERT. Scientific results of Explorations by the U. S. Fish Commission steamer *Albatross*. No. XII. A preliminary report on the fishes collected by the steamer *Albatross* on the Pacific coast of North America during the year 1889, with description of twelve new genera and ninety-two new species.
Proc. U. S. Nat. Mus., XIII, No. 797, July 1, 1890, pp. 49-126.

CHARLES H. GILBERT. Description of a new species of *Etheostoma* (*E. micropterus*) from Chihuahua, Mexico.
Proc. U. S. Nat. Mus., XIII, No. 823, November 15, 1890, pp. 289, 290.

CHARLES H. GILBERT. Scientific Results of Explorations by the U. S. Fish Commission steamer *Albatross*. No. XIX. A supplementary list of fishes collected at the Galapagos Islands and Panama, with descriptions of one new genus and three new species.
Proc. U. S. Nat. Mus. XIII, No. 840, May 29, 1891, pp. 449-455.

THEODORE GILL. The osteological characteristics of the family *Anguillidæ*.
Proc. U. S. Nat. Mus., XIII, No. 803, September 9, 1890, pp. 157-160.

THEODORE GILL. The osteological characteristics of the family *Synaphobranchidæ*.
Proc. U. S. Nat. Mus., XIII, No. 804, September 9, 1890, pp. 161-164.

THEODORE GILL. The osteological characteristics of the family *Murænidæ*.
Proc. U. S. Nat. Mus., XIII, No. 805, September 9, 1890, pp. 165-170.

THEODORE GILL. Osteological characteristics of the family *Muræsocidæ*.
Proc. U. S. Nat. Mus., XIII, No. 815, September 16, 1890, pp. 231-234.

THEODORE GILL. On the family *Ranicipitidæ*.
Proc. U. S. Nat. Mus., XIII, No. 816, October 14, 1890, pp. 235-238, pl. xviii.

THEODORE GILL. The osteological characteristics of the family *Simenchelyidæ*.
Proc. U. S. Nat. Mus., XIII, No. 817, October 14, 1890, pp. 239-242.

THEODORE GILL. The characteristics of the *Dactylopteroidea*.
Proc. U. S. Nat. Mus., XIII, No. 818, October 14, 1890, pp. 243-248, pl. xix.

THEODORE GILL. Osteological characteristics of the family *Amphipnoidæ*.
Proc. U. S. Nat. Mus., XIII, No. 825, December 11, 1890, pp. 299-302.

THEODORE GILL. Note on the *Aspredinidæ*.
Proc. U. S. Nat. Mus., XIII, No. 831, April 18, 1891, pp. 347-352.

THEODORE GILL. Note on the genus *Felichthys* of Swainson.
Proc. U. S. Nat. Mus., XIII, No. 832, April 8, 1891, pp. 353, 354.

THEODORE GILL. The characteristics of the family of Scatophagoid fishes.
Proc. U. S. Nat. Mus., XIII, No. 833, April 18, 1891, pp. 355-360.

THEODORE GILL. On the relations of *Cyclopteroidea*.
Proc. U. S. Nat. Mus., XIII, No. 834, May 8, 1891, pp. 361-376, pl. xxviii-xxx.

THEODORE GILL. The osteological characteristics of the family *Hemitripteridæ*.
Proc. U. S. Nat. Mus., XIII, No. 835, May 8, 1891, pp. 377-380, pl. xxxi.

THEODORE GILL. American catfish's care of young.
Forest and Stream. XXXV, Nov. 27, 1890, p. 378.

GEORGE BROWN GOODE. First Draft of a System of Classification for the World's Columbian Exposition.*
Printed privately for the World's Columbian Commission, Chicago, 1890. Prepared at the request of the Commission.

GEORGE BROWN GOODE. Report upon the condition and progress of the U. S. National Museum during the year ending June 30, 1888.
Smithsonian Report (U. S. National Museum), 1888 (1890), pp. XXII + 876.

JOHN HENRY GURNEY. Notes on *Buteo* (*Onychotes*) *solitarius*.
The Ibis, sixth series, VIII, January, 1891, pp. 21-24.
A posthumous paper.

* Reprinted in this Report. See p. 649.

EDWARD HARGITT. Catalogue | of the | Picariæ | in the | collection | of the | British Museum. | — | Scansores, | containing the family | Picidæ. | By | Edward Hargitt. | London: [Seven lines omitted.] 1890.

Catalogue of the Birds in the British Museum, Vol. XVIII.

EDWIN M. HASBROUCK. The present status of the Ivory-billed Woodpecker (*Campephilus principalis*).

The Auk, VIII, April, 1891, pp. 174–186. (With a map showing former and present geographical range.)

An important and timely paper on an interesting subject, the data which the author was able to compile showing that since Audubon's time the area inhabited by the species has greatly decreased in extent, no less than seven States and one Territory formerly occupied in part, by it, having become entirely forsaken.

O. P. HAY. The skeletal anatomy of *Amphiuma* during its earlier stages.

Journal of Morphology, IV, pp. 11–34, pl. ii. Based in part upon material supplied by the National Museum, for which due acknowledgment is made.

ROMYN HITCHCOCK. The action of light on silver chloride.

Amer. Chem. Jour., XIII, No. 4, April, 1891, pp. 273–277.

Demonstrating that light acting upon extremely thin films of silver chloride sets free chlorine to the extent of 8.57 per cent, or more, and that a quantity of metallic silver equivalent to the weight of chlorine set free is rendered soluble in nitric acid.

THEODOR HOLM. Notes on the leaves of Liriodendron.

Proc. U. S. Nat. Mus., XIII, No. 794, September 9, 1890, pp. 15–35, pl. iv–ix.

This paper contains a description of the variation in the foliage of the only living species, *Liriodendron tulipifera*. The different forms of leaves are figured and compared with the ancient types, and it has been stated that most of these ancient forms, described as species, do not differ in any higher degree from each other than does a series of leaves of the recent tree when studied at different stages, from the germination to the mature stage.

THEODOR HOLM. Review of Edward Hackel's "The True Grasses," translated from "Die natürlichen Pflanzenfamilien" (Engler und Prantl) by F. Lamson-Scribner and Effie Southworth.

Botanical Gazette, XV, August, 1890, pp. 212, 213.

THEODOR HOLM. Review of O. Norstedt's "Fresh-water Algæ, collected by Dr. S. Berggren in New Zealand and Australia."

Botanical Gazette, XV, September, 1890, pp. 238, 239.

THEODOR HOLM. Review of C. D. White's "On Cretaceous Plants from Martha's Vineyard" (Amer. Jour. Sci., XXXIX, 1890).

Botanical Gazette, XV, October, 1890, pp. 272, 273.

THEODOR HOLM. Mounting plants.

Botanical Gazette, XV, December, 1890, pp. 341, 342.

This article calls attention to the poor manner in which the plants are often preserved in the herbaria in this country. Instead of fixing the specimens with glue to the paper it is recommended merely to use gummed strips of paper, so that the plants may easily be taken off and handled for studies of various kinds.

THEODOR HOLM. Notes upon *Uvularia*, *Oakesia*, *Diclytra*, and *Krigia*.

Bulletin of the Torrey Botanical Club, XVIII, January, 1891, pp. 1–11, pl. cxi–cxiii.

The structure of the rhizomes of these plants is described, as well as the anatomical characters observed in *Uvularia* and *Oakesia*.

THEODOR HOLM. Review of E. Haeckel's "Ueber einige Eigenthümlichkeiten der Gräser trockener Klimate."

(Verhandl. d. k. k. Zool.-Bot. Gesellschaft, Wien, 1890.)

Botanical Gazette, XVI, March, 1891, pp. 87, 88.

THEODOR HOLM. Contributions to the knowledge of the germination of some North American plants.

Memoirs of the Torrey Botanical Club, II, April 15, 1891, pp. 57–108, pl. v–xix.

This paper deals with the germination and further development of the rhizomes of about forty species, mostly from North America.

THEODOR HOLM. Review of F. Börgesen's "*Desmidieæ*" (Symbolæ ad floram Brasil. cognoscendam, particula 34).

Botanical Gazette, XVI, May, 1891, p. 158.

THEODOR HOLM. Review of a series of papers by C. Sauvageau on aquatic plants.

Botanical Gazette, XVI, June, 1891, p. 184.

THEODOR HOLM. Review of Russell's "Etude des folioles anormales du *Vicia sepium*" (Revue Générale de Botanique, No. 23).

Botanical Gazette, XVI, June, 1891, p. 190.

THEODOR HOLM. A study of some anatomical characters of North American *Gramineæ*.

Botanical Gazette, XVI, June, 1891, pp. 166–171, pl. XV.

The principal object of this paper is to show the importance of anatomical studies for discrimination of species in a flowerless stage.

WILLIAM H. HOLMES. Excavations in an ancient soapstone quarry in the District of Columbia.

The American Anthropologist, III, No. 4, 1890, pp. 321–330.

The existence of ancient pits made in quarrying soapstone has been known for several years. Excavation showed that considerable area had been worked over in securing masses of stone for making pots, but that the depth penetrated did not exceed four or five feet. Many of the stone picks and chisels used in mining and in shaping the vessels were recovered. There are hundreds of the partially finished pots upon the site.

WILLIAM H. HOLMES. The Thruston tablet.

The American Anthropologist, IV, No. 2, 1891, pp. 161–165.

In this paper is given a description of a very interesting engraved stone from Sumner County, Tenn. Numerous figures in savage costume are delineated in sharp, firm lines, which evince decided talent for graphic presentation, but convey no intelligible idea or story.

WILLIAM H. HOLMES. Report on the Department of American Aboriginal Pottery in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), p. 105.

WALTER HOUGH. Aboriginal Fire-making.

The American Anthropologist, III, No. 4, October, 1890, pp. 359–372. Gives classification, description, and range of the methods of fire-making, with illustrations.

WALTER HOUGH. The Last Steps in the Genealogy of Man. [Translation.]

Report of the Smithsonian Institution, 1889 (1890), pp. 669–694.

Translation of a lecture by Dr. Paul Topinard, delivered in March, 1888, in the École d'Anthropologie of Paris.

WALTER HOUGH. Arrow Feathering and Pointing.

The American Anthropologist, IV, No. 1, 1891, p. 60.

Portion of a symposium on Arrows and Arrow-Makers, by Otis T. Mason, W. H. Holmes, Thomas Wilson, Walter Hough, Weston Flint, W. J. Hoffman and John G. Bourke.

LELAND O. HOWARD. A new and remarkable Encyrtid: Is it parasitic?

Insect Life, III, No. 4, November, 1890, pp. 145–148, fig. 1.

A description of *Tanaostigma*, nov. gen., *coursetiæ*, n. sp., with an account of its habits as found in ovaries of *Coursetia* (?) *mexicana*, a leguminous plant growing in the Alamos Mountains, Mexico.

LELAND O. HOWARD. The host relations of Parasitic Hymenoptera.

Insect Life, III, No. 6, March, 1891, pp. 277–279.

A plea for the importance of the study of the host relations of parasitic Hymenoptera, with a review of the work of recording published rearings undertaken by the writer, and a promise to determine all bred material sent in by comparison with the collections of the National Museum.

LELAND O. HOWARD. The habits of *Eurytoma*.

Proc. Entom. Soc. Washington, II, No. 1, April, 1891, pp. 66, 67.

A review of the supposed food habits of the species of this genus, with an account of actual observations upon the larva of *E. prunicola* feeding upon the larva of *Cynips q-prunus* in the gall of the latter.

LELAND O. HOWARD. The habits of *Pachyneuron*.

Proc. Entom. Soc. Washington, II, No. 1, April, 1891, pp. 105–109, fig. 1.

A review of the habits of this genus of *Chalcididæ*, with a tabulated record of the host habits as indicated by the material in the collection of the U. S. National Museum.

LELAND O. HOWARD. The parasites of the *Hemerobiinæ*.

Proc. Entom. Soc. Washington, II, No. 1, April, 1891, pp. 123, 124.

A review of the known hymenopterous parasites of this group of insects in Europe, with an enumeration of those found, and hitherto unrecorded, in America.

(See also under CHARLES V. RILEY.)

DAVID STARR JORDAN. Notes on the fishes of the genera *Agonia*, *Algansea*, and *Zophendum*.

Proc. U. S. Nat. Mus., XIII, No. 822, November 15, 1890, pp. 287, 288.

DAVID STARR JORDAN. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. No. XVIII.—List of fishes obtained in the harbor of Bahia, Brazil, and in adjacent waters.

Proc. U. S. Nat. Mus. XIII, No. 829, April 8, 1891, pp. 313–336.

DAVID STARR JORDAN. The Sunapee Trout.

Forest and Stream, XXXVI, January 22, 1891, p. 6.

DAVID STARR JORDAN and BARTON WARREN EVERMANN. Description of a new species of fish from Tippecanoe River, Indiana. (*Etheostoma tippecanoe*, sp. nov.)

Proc. U. S. Nat. Mus., XIII, No. 791, July 1, 1890, pp. 3, 4.

F. H. KNOWLTON. Description of fossil wood and lignites from Arkansas.

Annual Report of the Geological Survey of Arkansas, II, 1889, pp. 249–267, pls. IX–XI.

The lignite is described as being very badly preserved, but as far as could be made out was nearly all coniferous. The silicified wood represents five species (*Cupressinoxylon arkansanum*, *C. Calkii*, *Laurinoxylon Branneri*, *L. Lesquereuxiana*, and *L.*, n. sp.?), all of which were new to science.

F. H. KNOWLTON. Directions for collecting recent and fossil plants.

Bull. U. S. Nat. Mus., No. 39, Pt. B., pp. 1–46, figs. 1–10.

Gives simple directions for making collections of recent and fossil plants in the field, their packing and shipment, and arrangement for study in the laboratory.

F. H. KNOWLTON. A revision of the genus *Araucarioxylon* of Kraus, with compiled descriptions and partial synonymy of the species.

Amer. Jour. Sci., third series, XL, September, 1890, p. 257.

F. H. KNOWLTON. Botany for 1887 and 1888.

Report of the Smithsonian Institution, 1888 (1890), pp. 475–496.

(See also under W. M. FONTAINE).

S. R. KOEHLER. Catalogue of the engraved and lithograph work of John Cheney and Seth Wells Cheney.

Privately printed, Lee & Shepard, Boston, 1891. 8vo., pp. 1–161. (Portrait of John Cheney).

Contains, besides the list of engravings, etc., a list of the books in which the plates engraved by the Cheneys were published.

S. R. KOEHLER. Exhibition of books, water colors, engravings, etc., by William Blake, February 7 to March 15, 1891, Boston, 1891.

Catalogue of an exhibition held at the Museum of Fine Arts, Boston, with technical and biographical notes, a chronological list of the works exhibited, and a list of books, etc., concerning Blake.

S. R. KOEHLER. Friedrich Juengling und der moderne Holzstich.

Zeitschrift für bildende Kunst, (Leipsic) II, Nos. 4, 5, January, February, 1891.

An exposition of the history of the production of relief-blocks for printing, technically considered, in which the engravings of the late Friedrich Juengling are more especially used as examples of modern methods.

S. R. KOEHLER. Ueber die Technik des alten Holzschnittes.

Chronik für vervielfältigende Kunst (Vienna) III, Nos. 11, 12, 1891. (Illustrated.)

A study of the tools used by the old woodcutters, based upon representations of tools found upon their works in connection with their monograms.

S. R. KOEHLER. Jacob Binck's Porträt Christian's II.

Chronik für vervielfältigende Kunst (Vienna), IV, No. 2, 1891.

Short note calling attention to the fact that this portrait, which is commonly described as an etching, is a work of the graver.

S. R. KOEHLER. Das Monotyp.

Chronik für vervielfältigende Kunst (Vienna) IV, No. 3, 1891. (Illustrated.)

A technical and historical account of the monotype, which is generally supposed to be a modern invention, but was practised already by Benodetto Castiglione, 1616–1670.

S. R. KOEHLER. Statement relating to the collection illustrating the graphic arts in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 123–128.

GEORGE N. LAWRENCE. Description of a new subspecies of *Cypselidæ* of the genus *Chætura*, with a note on the Diablotin.

The Auk, VIII, January, 1891, pp. 59–62.

Chætura dominicana colardeaui, p. 59, Guadeloupe, W. I.

LEO LESQUEREUX. Remarks on some fossil remains considered as peculiar kinds of marine plants.

Proc. U. S. Nat. Mus., XIII, No. 792, July 18, 1890, pp. 5–12, pl. 1.

J. G. LOCKHART. Notes on the habits of the moose in the far north of British America in 1865.

Proc. U. S. Nat. Mus., XIII, No. 827, November 15, 1890, pp. 305–308.

LEVERETT M. LOOMIS. A further review of the avian fauna of Chester County, S. C.

The Auk, VIII, January, 1891, pp. 49–59.

LEVERETT M. LOOMIS. A further review of the avian fauna of Chester County, S. C.

The Auk, VIII, April, 1891, pp. 167–173.

(Continued from p. 59.)

F. A. LUCAS. Some bird skeletons from Guadalupe Island.

The Auk, VIII, No. 2, April, 1891, pp. 218–222.

Notes osteological differences existing between species from Guadalupe Island and allied species from the mainland, showing that in some cases the insular birds had degenerated in power of flight and in others progressed.

F. A. LUCAS. A tortoise from Duncan Island.

Nature, XLIV, No. 5, June 4, 1891, p. 113.

Noting the capture of a tortoise on Duncan Island, of the Galapagos group. The species proved to be *Testudo ephippium* Gthr., and this is the first instance of the capture of this species on Duncan Island. *T. ephippium* is stated to be quite distinct from *T. abingdoni*.

F. A. LUCAS. Notes on the Osteology of the *Paridæ*, *Sitta* and *Chamæa*.

Proc. U. S. Nat. Mus., XIII, No. 830, April 8, 1891, pp. 337–345, pl. XXVII, figs. 5.

Describes the osteological characters shown by various genera of *Paridæ*, *Sitta* and *Chamæa*. The group is said to be not so homogeneous as others among Passeres. *Sitta* is stated not to be related to the Tits and *Chamæa* to be intermediate between *Parus* and *Troglodytes*.

F. A. LUCAS. The expedition to Funk Island, with observations upon the history and anatomy of the Great Auk.

Report of the Smithsonian Institution (U. S. National Museum) 1888 (1890), pp. 493–529, plates LXXI–LXXIII.

Describes the expedition in search of Great Auk remains and treats at some length the individual skeletal variations of the Great Auk. Contains a fairly full bibliography of works pertaining to the species.

F. A. LUCAS. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. No. XIII.—Catalogue of skeletons of birds collected at the Abrolhos Islands, Brazil, the Straits of Magellan, and the Galapagos Islands, in 1887–'88.

Proc. U. S. Nat. Mus., XIII, No. 798, July 1, 1890, pp. 127–130.

F. A. LUCAS. Report on the Department of Comparative Anatomy in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 181, 182.

C. L. MARLATT. (See under CHARLES V. RILEY.)

OTIS TUFTON MASON. Arrows and arrow-makers.

The *American Anthropologist*, IV, January, 1891, pp. 45–47.

OTIS TUFTON MASON. The American Association for the Advancement of Science (A review of Section H.)

The *American Anthropologist*, IV, October, 1891, pp. 377–380.

OTIS TUFTON MASON. The natural history of folk-lore.

Journal of American Folk-Lore, IV, April-June, 1891, pp. 97–106.

OTIS TUFTON MASON. Report on the Department of Ethnology in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 88–92.

OTIS TUFTON MASON. Anthropology for 1887 and 1888.

Report of the Smithsonian Institution, 1888 (1890), pp. 497–582.

EDGAR A. MEARNS. Descriptions of a new species and three new subspecies of birds from Arizona.

The Auk, VIII, July, 1890, pp. 243–251.

New birds described are (1) *Junco ridgwayi*, p. 243, Whipple Barracks; (2) *Spinus tristis pallidus*, p. 244, Fort Verde; (3) *Melanerpes formicivorus aculeatus*, p. 249, Squaw Peak. In addition to these, *Coccothraustes vespertina montana* (Ridgw.) is restored (p. 246) as a valid form.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 1–30.
This work is intended to briefly outline the aims and present condition of the Department
The name *handbook* is rather too pretentious for so brief a paper.

GEORGE P. MERRILL. Report of progress in petrography for 1887 and 1888.
Report of the Smithsonian Institution, 1888 (1890), pp. 327–354.

GEORGE P. MERRILL. On grindstones and whetstones.
Stone, (Indianapolis, Indiana), III, No. 3, July, 1890.

GEORGE P. MERRILL. Lithographic limestones.
Stone, (Indianapolis, Indiana), III, No. 4, August, 1890.

GEORGE P. MERRILL. (1) Asbestos. (2) Stones used by the ancient Assyrians. (3) Something about pumice.
Stone (Indianapolis, Indiana), III, No. 6, October, 1890.

GEORGE P. MERRILL. Charms and medicinal stones.
Stone (Indianapolis, Indiana), III, No. 7, November, 1890.

GEORGE P. MERRILL. Critical notes on American marbles.
Stone (Indianapolis, Indiana), III, No. 8, December, 1890.

GEORGE P. MERRILL. (1) Concerning agates. (2) Nephrite or jade.
Stone (Indianapolis, Indiana), III, No. 9, January, 1891.

GEORGE P. MERRILL. Some popular fallacies.
Stone (Indianapolis, Indiana), III, No. 10, February, 1891.

GEORGE P. MERRILL. (1) Some facts about kaolin. (2) Natural sandblast.
Stone (Indianapolis, Indiana), III, No. 11, March, 1891.

GEORGE P. MERRILL. The formation of mountains.
Stone (Indianapolis, Indiana), III, No. 12, and IV, No. 1.

GEORGE P. MERRILL. Report on the department of lithology and physical geology in the U. S. National Museum, 1888.
Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 199–208.

E. W. NELSON. Scott's oriole (*Icterus parisorum*) in central New Mexico.
The Auk, VIII, April, 1891, pp. 237, 238.

WILLIAM PALMER. Notes on the birds observed during the cruise of the United States Fish Commission schooner *Grampus* in the summer of 1887.
Proc. U. S. Nat. Mus., XIII, No. 819, October 14, 1890, pp. 249–265.
A valuable and interesting account of the habits of the species collected.

CHARLES S. PROSSER. The thickness of the Devonian and Silurian rocks of western central New York.

RICHARD RATHBUN. Report on the department of Marine Invertebrates in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 173–180.

ROBERT RIDGWAY. *Falco dominicensis* Gmel., versus *Falco sparverioides* Vig.

The Auk, VIII, January, 1891, pp. 113, 114.

Showing that the two names are synonymous, and that the former, having priority, is the one which should be used for the species.

ROBERT RIDGWAY. A new name necessary for *Selasphorus floresii*.

The Auk, VIII, January, 1891, p. 114.

Proposing as a substitute for the preoccupied specific name that of *rubromitratus* (*Trochilus*, or *Selasphorus*, *rubromitratus*).

ROBERT RIDGWAY. Note on the alleged occurrence of *Trochilus heloisa* (Less. and DeLattr.) within North American limits.

The Auk, VIII, January, 1891, p. 115.

Showing that the supposed *T. heloisa* from El Paso, Texas, is in reality *T.* (or *Stellula*) *calliope*.

ROBERT RIDGWAY. *Cistothorus mariane*, *Buteo lineatus alleni*, and *Syrnium nebulosum alleni* in South Carolina.

The Auk, VIII, April, 1891, p. 240.

ROBERT RIDGWAY. Further notes on the genus *Xiphocolaptes* of Lesson.

Proc. U. S. Nat. Mus., XIII, No 796, July 1, 1890, pp. 47, 48.

ROBERT RIDGWAY. Observations on the Farallon Rail (*Porzana jamaicensis coturniculus* Baird).

Proc. U. S. Nat. Mus., XIII, No. 828, November 15, 1890, pp. 309–311.

Demonstrates its specific distinctness from *P. jamaicensis* and its near relationship to *P. spilonota* (Gould) of the Galapagos Islands.

ROBERT RIDGWAY. Allen on birds from Quito.

The Auk, VII, October, 1890, pp. 380, 381. (Review.)

ROBERT RIDGWAY. Allen on birds collected in Bolivia.

The Auk, VII, October, 1890, pp. 381, 382. (Review.)

ROBERT RIDGWAY. Allen on the genus *Cyclorhis*.

The Auk, VII, October, 1890, pp. 382–384. (Review.)

ROBERT RIDGWAY. Allen's descriptions of new South American birds.

The Auk, VII, October, 1890, pp. 384, 385. (Review.)

ROBERT RIDGWAY. Allen on individual variation in the genus *Elainea*.

The Auk, VII, October, 1890, pp. 385, 386. (Review.)

ROBERT RIDGWAY. Allen on the Maximilian types of South American birds.

The Auk, VII, October, 1890, pp. 386, 387. (Review.)

ROBERT RIDGWAY. Report on the department of Birds in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 145–150.

ROBERT RIDGWAY. Spencer Fullerton Baird. (Biographical.)

Report of the Smithsonian Institution, 1888 (1890), pp. 703–713.

CLARENCE B. RIKER. A list of birds observed at Santarem, Brazil. With annotations by Frank M. Chapman.

The Auk, VIII, January, 1891, pp. 24–31. (Continued from VIII, p. 271.)

Field and critical notes on 78 species. April, 1891, pp. 158–164. Includes 103 species, Nos. 149–251, inclusive. July, 1891, pp. 265–271. Includes 70 species.

CHARLES V. RILEY. Animal ailments. Lice which affect horses and cattle.

American Agriculturist, L, March, 1891, pp. 176–178.

An illustrated account of the more important species of the *Pediculidæ* and *Mallophaga* infesting horses and cattle, with brief references to their life-histories and characteristics. The remedies hitherto used are more fully discussed as to their merits and disadvantages, and the application of diluted kerosene emulsion recommended as the best and cheapest remedy.

CHARLES V. RILEY. The mercury cure for Phylloxera.

Scientific American, LXIV, May 9, 1891, p. 292.

Reply to inquiry of Mr. Joseph de Susini, giving information regarding the Phylloxera remedy proposed by J. A. Bauer, which consists in applying around the base of the plant a mixture composed of quicksilver and pulverized clay.

CHARLES V. RILEY. The *Pediculi* and *Mallophaga* affecting man and the lower animals, by Prof. Herbert Osborn.

U. S. Department of Agriculture, Division of Entomology, Bulletin 7, Washington, April, 1891.

Contains letter of submittal by C. V. Riley (p. 3), and an illustrated review of the parasite mentioned by Herbert Osborn. The following are described as new: *Hæmatopinus sciuropteris* (pp. 23, 24); *H. antennatus* (p. 25); *H. hesperomydis* (p. 26); *H. suturalis* (p. 27); *Hæmatopinoides*, nov. gen. (p. 28); *Hæmatopinoides squamosus* (pp. 28, 29); all of the family *Pediculidæ*, and *Trichodectes geomydis* (p. 54) of the family *Philopteridæ*.

CHARLES V. RILEY. The Boll-worm of cotton. A report of progress in a supplementary investigation of this insect. Made under the direction of the Entomologist, by F. W. Mally.

U. S. Department of Agriculture, Division of Entomology, Bulletin 24, Washington, May, 1891.

Contains letter of submittal (p. 3), and introduction (pp. 5, 6), by C. V. Riley. The report itself on the Boll-worm of cotton, by F. W. Mally, has the following chapters: Destructiveness (pp. 14–25); Number of broods and hibernation (pp. 25–27); Natural enemies (pp. 27, 28); Insect ravages easily mistaken for those of the Boll-worm (pp. 28–31); Remedies (pp. 31–45); Insect diseases (pp. 48–50).

CHARLES V. RILEY. Reports of observations and experiments in the practical work of the Division made under the direction of the Entomologist.

U. S. Department of Agriculture, Division of Entomology, Bulletin 23, Washington, May, 1891.

Contains the following: Letter of submittal by C. V. Riley (p. 5); Introduction by C. V. Riley (pp. 7, 8); Report on Nebraska insects by Lawrence Bruner (pp. 9–18); Report on various methods of destroying scale insects, by D. W. Coquillett (pp. 19–36); Report of experiments with the resin compounds on *Phylloxera*, and general notes on California insects, by Albert Koebele (pp. 37–44); Entomological notes for the season of 1890, by Mary E. Murtfeldt (pp. 45–56); Report on work of the season, by Herbert Osborn (pp. 57–62); Report on some of the insects affecting cereal crops, by F. M. Webster (pp. 63–79).

CHARLES V. RILEY. Destructive locusts. A popular consideration of a few of the more injurious locusts (or "grasshoppers") of the United States, together with the best means of destroying them.

U. S. Department of Agriculture, Division of Entomology, Bulletin 25, Washington, May, 1891.

Contains the following titles: Letter of submittal (p. 5); Introduction (pp. 7, 8); The Rocky Mountain Locust (*Caloptenus spretus* Thomas) (pp. 9–26); The lesser migratory Locust (*Caloptenus atlanis* Riley) (pp. 26, 27); The non-migratory red-legged Locust (*Caloptenus femur-rubrum* Harr.) (pp. 27, 28); The California devastating Locust (*Caloptenus devastator* Scudd.) (pp. 28–30); The differential Locust (*Caloptenus differentialis* Thos.) (pp. 30, 31); The two-striped Locust (*Caloptenus bivittatus* Scudd.) (pp. 31, 32); The pellucid Locust (*Camnula pellucida* Scudd.) (pp. 32, 33); The American Acridium (*Schistocera americana* Scudd.) (pp. 33, 34); Remedies and devices for the destruction of Locusts (pp. 34–60).

CHARLES V. RILEY. Condensed information concerning some of the more important insecticides.

U. S. Department of Agriculture, Division of Entomology, Circular 1, Second Series, May, 1891, pp. 1–7.

Short directions for preparing and applying the following insecticide substances: Kerosene emulsion, resin washes, London purple, and white arsenic.

CHARLES V. RILEY. The Hop Plant-louse and the remedies to be used against it.

U. S. Department of Agriculture, Division of Entomology, Circular 2, Second Series, June, 1891, pp. 1–7.

A brief summary of the life-history of *Phorodon humuli*; the measures available for its destruction; formulas for kerosene emulsions and fish-oil soap; the best spraying apparatus.

CHARLES V. RILEY. Report of the Entomologist.

Report of the Secretary of Agriculture, 1890, pp. 237–264, pl. i–vii.

Contains the following titles: Introduction giving a summary of the work and publications of the Division of Entomology (pp. 237–239); The Boll-worm investigation (pp. 240, 241); The Army Worm (pp. 242–244); The bronzy Cut-worm (Larva of *Nephelodes violans*) (pp. 244–246); Additional notes on the Horn-fly (*Hæmatobia serrata*) (pp. 246–249); Some new Iceryas (pp. 250, 251); Experiments against the Black Scale (*Lecanium oleæ* Bernard) (pp. 251–253); The green-striped Maple Worm (*Anisota rubicunda* Fabr.) (pp. 253–255); A new Peach Pest (*Ceratitis capitata* Wied) (pp. 255–257); The Rose Chafer (*Macrodactylus subspinosus* Fabr.) (pp. 257–261); The work of field agents (pp. 261–264).

CHARLES V. RILEY. Insecticides and means of applying them to shade and forest trees.

Fifth Report of the U. S. Entomological Commission (Washington), 1890, pp. 31–47.

The first part gives a summary of the insecticides available for the protection of forest and shade trees from the attacks of leaf-eating insects. The arsenical poisons, kerosene emulsions, and hydrocyanic acid gas are especially treated of. The second part enumerates and describes the apparatus for the application of insecticides in dry or liquid form, and more especially in various nozzles or pumps for spraying, many of which are figured.

CHARLES V. RILEY. Insects injurious to the Hackberry.

Fifth Report of the U. S. Entomological Commission (Washington), 1890, pp. 601–622.

Description and natural history of the more important insect enemies of *Celtis occidentalis* in North America, and enumeration of many other species found on this tree. The following species are more fully treated: *Apatura celtis*, *A. clyton*, *Grapta interrogationis*, *Libythea bachmanni*, *Acronycta rubricoma*, *Graphisurus triangulifer*, *Alaus lusciosus*, *Scolytus fagi*, Cecidomyiidous Hackberry galls, and Hackberry Phyllidæ (genus *Pachyprylla*). A number (six) of hitherto undescribed Cecidomyiidous galls: *P. celtidis-vesiculum*, *P. celtidis-asterius*, *P. celtidis-umbilicus*, *P. celtidis-pubescens*, *P. celtidis-globulus*, *P. celtidis-cucurbita*, and *P. celtidis-cucurbita* var. A synoptic table of the Pachyprylla galls is given, as well as a table of the groups of the imagos of this genus.

CHARLES V. RILEY. Notes on the Larva of *Platypsyllus*.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, pp. 27, 28.

Additional characters of the ultimate larva of *Platypsyllus* not mentioned in a previous paper (*Entomologica Americana*, February, 1890), viz., the arrangement of the ventral setæ, the rudimentary setæ and the presence of stigmata. Reasons why this larva can not be referred to the *Mallophaga*, but the presence of ocelli is a very anomalous character.

CHARLES V. RILEY. On the difficulty of dealing with *Lachnosterna*.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, pp. 58–60.

Account of the failure to protect by available means (spraying with a strong whale-oil and tobacco soap solution, application of London purple, attracting the beetles by light), certain freshly transplanted trees in the author's garden from the nocturnal attacks of *Lachnosternas*. The nature of the injury by the beetles consists almost exclusively in gnawing off the petioles and not in devouring the leaves. The principal practical conclusion drawn from this experience is that the injury can be averted if the ground beneath or near the trees be kept free from the *Lachnosterna* larvæ.

CHARLES V. RILEY. A viviparous Cockroach.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, pp. 129, 130.

Exhibition of and remarks on a specimen of *Panchlora viridis* which had given birth to the young viviparously. Remarks on the characteristics of the young larvæ and on the anomalous nature of viviparity in the *Blattidæ*.

CHARLES V. RILEY. Additional remarks on *Platypsyllus castoris*.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, pp. 130, 131.

Failure to find the pupa and additional specimens of the ultimate larva of the beaver parasite, and enumeration of other insects found in beaver dens.

CHARLES V. RILEY. Remarks on an aquatic insect larva from Ceylon.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, p. 131.

A shortly characterized but not determined larva found in the mountain streams of Ceylon, and exhibited by Mr. C. J. Gahan before the London Entomological Society, October 1, 1890, must be referred to the Dipterous family *Blepharoceridæ*. Mention that the earlier stages of two North American species of this family are known.

CHARLES V. RILEY. Remarks on the larva of *Citheronia sepulchralis*.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, pp. 131, 132.

Identification, distribution, and food plants of *Citheronia sepulchralis*, called forth by an article by Mrs. Julia P. Ballard, in *Entomological News*, October, 1890, entitled "What can it be?"

CHARLES V. RILEY. On the time of transformation in the genus of *Lachnosterna*.

Proceedings of the Entomological Society of Washington, II, No. 1, May, 1891, pp. 132–134.

Prof. Forbes' statement that all *Lachnosterna* larvæ change to pupa and imago in summer and fall must be modified, and while this mode of transformation normally takes place in those species which appear early in the season, evidence is brought forth to prove that in the late-appearing species transformation takes place in the spring of the same year in which the imagoes appear.

CHARLES V. RILEY. The outlook for economic entomology.

Indiana Farmer, July 5 and 12, 1890.

A condensed account of the progress in American economic entomology during the past

CHARLES V. RILEY—Continued.

twenty years. The subject is treated under the following headings: 1. The advance in the knowledge of the life-histories of injurious insects; 2. The progress in experimentation with insecticide substances; 3. The invention and improvement of apparatus for the application of insecticides.

CHARLES V. RILEY. The outlook for applied entomology.

Insect Life, III, No. 5, January, 1891, pp. 181–210.

Annual address as president of the Association of Economic Entomologists held at the second annual meeting of the Association at Champaign, Ill., November 11, 1890. The address touches the following topics: Some results in economic work from the National Department at Washington: the Hop Phorodon on the Pacific Coast: the Grape Phylloxera, the value of the resisting American vines and the resin soap as a remedy: introduction of parasites and predaceous species; method of using bisulphide of carbon against grain weevils: insecticide machinery: Strawson's air-power distributor: international interests: use of contagious germs in the field: agriculture: silk culture: legislation: publications of the experiment stations: coöperation: the Department of Agriculture and the State stations: status of the Association of Economic Entomologists: technical papers and credit in station publications: conclusion.

CHARLES V. RILEY. List of Coleopterous larvæ sent by C. V. Riley to F. Meinert of Copenhagen, for the University Museum, in exchange for European specimens from the Schiödte Collection.

Insect Life, III, Nos. 7 and 8, April, 1891, pp. 330–332.

The list embraces 125 species of North American Coleoptera.

CHARLES V. RILEY. On the destruction of the Gypsy Moth in Massachusetts.

Insect Life, III, Nos. 9 and 10, June, 1891, pp. 368–379.

Remarks made by C. V. Riley at a conference held in the rooms of the Committee on Agriculture, Boston, Mass., March 4, 1891. The remarks refer to the possibility and the means of exterminating *Ocneria dispar* under State appropriations. The principal participants in the discussion were Profs. N. S. Shaler, C. V. Riley, C. H. Fernald, and Mr. S. H. Scudder.

CHARLES V. RILEY. | Fifth Report | of the | United States | Entomological Commission, | being a revised and enlarged edition of | Bulletin No. 7 | on | Insects injurious to Forest and Shade Trees. | By | Alpheus S. Packard, M. D., Ph. D. | — | With wood-cuts and 30 plates. | Washington: | Government Printing Office, | 1890. |

The following portions were written by Charles V. Riley: Letters of submittal (p. viii); insecticides and means of applying them to shade and forest trees (pp. 31–47); insects injurious to the Hackberry (chap. XII, pp. 601–622). The report contains also copies or abstracts of Riley's unpublished notes on forest insects.

CHARLES V. RILEY. Report on the Department of Insects in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 165–171.

CHARLES V. RILEY and L. O. HOWARD. A peach pest in Bermuda (*Ceratitis capitata Wied*). Order Diptera; Family *Trypetidæ*.

Insect Life, III, No. 1, August, 1890, pp. 5–8, figs. 1, 2.

History of the fly and of its injuries to oranges in various parts of the globe. Extent, nature of the injury to peaches on the Bermudas, remedies and preventive measures.

CHARLES V. RILEY and L. O. HOWARD. Some of the bred *Hymenoptera* in the National Collection.

Insect Life, III, No. 1, August, 1890, pp. 15–18.

A systematic enumeration of North American parasitic *Hymenoptera*, of the family *Braconidæ* (subfamily *Microgasterinæ* and *Agathidinæ*) and their hosts, with dates and localities. Continued from *Insect Life*, II, Nos. 11, 12, June, 1890, p. 353.

CHARLES V. RILEY and L. O. HOWARD. Some of the bred parasitic *Hymenoptera* in the National Collection.

Insect Life, III, No. 2, September 1890, pp. 57–61.

Continuation of the paper in *Insect Life*, III, No. 1, August, 1890, p. 18, and covering the following subfamilies of *Braconidæ*: *Euphorinæ*, *Meteorinæ*, *Calyptinæ*, *Alysiinæ*, *Dacnusinæ*, *Macrocentrinæ*, *Diospilinæ*, *Opiinæ*, *Ichneutinæ*, *Toxoneurinæ* and *Aphidinæ*.

CHARLES V. RILEY and L. O. HOWARD. Some new *Iceryas*.

Insect Life, III, No. 3, November, 1890, pp. 92–106, figs. 6–19.

Descriptions and figures of the following new species: *Icerya rosæ*, from Key West, Florida; *I. monserratensis* from Montserrat, West Indies; *I. palmeri* from Mexico. *Crossotosoma aegyptiacum* Douglas is referred to Icerya. A catalogue and synoptic tables of the known species of this genus are appended.

CHARLES V. RILEY and L. O. HOWARD. Some of the bred parasitic *Hymenoptera* in the National Collection.

Insect Life, III, No. 4, November, 1890, pp. 151–158.

Continuation of the paper in *Insect Life*, III, No. 2, September, 1890, p. 61, and embracing the subfamilies *Ichneumoninæ*, *Cryptinæ* and *Ophioniuæ* of the family *Ichneumonidæ*.

CHARLES V. RILEY and L. O. HOWARD. Editorials, reviews, and notes.

Insect Life, III, Nos. 1-11, August, 1890, to June, 1891. (See table of contents of each number of *Insect Life*.)

CHARLES V. RILEY and L. O. HOWARD. Correspondence of the Division of Entomology, U. S. Department of Agriculture.

Insect Life, III, Nos. 1-11, August, 1890, to June, 1891.

Selected letters from correspondents with the replies.

CHARLES V. RILEY and C. L. MARLATT. The Clover Mite (*Bryobia pratensis* Garman.)

Insect Life, III, No. 2, September, 1890, pp. 45–52, figs. 4, 5.

A full account of the distribution of this mite in North America; its mode of occurrence, injury to plants, and annoyance caused by its appearance in dwellings; its habits and life-history; and the remedies available for its destruction. The paper concludes with technical descriptions of the various stages.

J. N. ROSE. List of plants collected by Dr. Edward Palmer in 1890 in western Mexico and Arizona.

Contributions from the U. S. National Herbarium, I, No. 4, June 30, 1891, pp. 91–127. (With index.)

In this paper 475 plants are enumerated with remarks as to soil, locality, and size, with additional notes in case of rare or little-known species, and with descriptions of new species.

The following table shows the places visited, with date of collection and number of plants:

Places visited.	Date of collection.	Number collected.
Alamos and Alamos Mountain	March 26 to April 8	276–415 (inclusive).
Camp Huachuca, Arizona	April 26 to May 21	416–478 (inclusive).
Willow Springs	June 10 to 20	479–574 (inclusive).
Fort Apache	June 21 to 30	575–613 (inclusive).
Willow Springs	July 5, 6	614–626 (inclusive).
Alamos	September 16 to 30	627–751 (inc.) and 812.

The following list comprises the new species:

Ayenia paniculata.
Ayenia truncata.
Bidens Alamosana.
Bærhaavia Alamosana.
Bærhaavia Sonoræ.
Brongniartia Palmeri.
Bunchosia Sonorensis.
Clematis Palmeri.
Cordia Sonoræ.
Croton Alamosanum.
Diphysa racemosa.
Echinopepon cirrhopedunculatus.
Erigeron Alamosanum.
Euphorbia tuberosa.
Hosackia Alamosana.
Hymenatherum anomalum.
Hymenopappus radiata.
Ipomœa alata.
Ipomœa Grayi.
Leptorhœo tenuifolia.
Lysiloma Watsoni.
Metastelma latifolia.
Mimosa Palmeri.
Perezia montana.
Peritylc effusa.
Piscidia mollis.
Pithecolobium Mexicanum.
Rhus Palmeri.
Salvia Alamosana.
Schizocarpum Palmeri.
Sclerocarpus spatulatus.
Sebastiania Palmeri.
Sida Alamosana.
Solanum Grayi.
Stellaria montana.
Tabebuia Palmeri.
Tithonia fruticosa.
Tithonia Palmeri.
Tradescantia Palmeri.
Vernonia Palmeri.
Viguiera montana.
Willardia Mexicana.*
Zexmenia fruticosa.

* *Willardia* is a new genus of *Leguminosæ*.

CHARLES TORREY SIMPSON. Notes on *Bulimus Dormani*.

Nautilus, IV, No. 7, November, 1890, pp. 79–81. Describes habitat and relations of this specie

CHARLES TORREY SIMPSON. Notes on Mr. Hemphill's catalogue.

Nautilus, IV, No. 10, February, 1891, pp. 110–112.

CHARLES TORREY SIMPSON. On the means of distribution of the Unionidæ in th southern United States.

Nautilus, V, No. 2, June, 1891, pp. 15–17.

HUGH M. SMITH. On the disappearance of the Dick Cissel (*Spiza americana*) fro the District of Columbia.

Proc. U. S. Nat. Mus., XIII, No. 806, September 9, 1890, pp. 171, 172.

Shows that "no specimen has been obtained for nearly thirty years."

JOHN B. SMITH. Contributions toward a monograph of the *Noctuidæ* of Temperat North America.—Revision of *Homohadena*, Grote.

Proc. U. S. Nat. Mus., XIII, No. 838, April 18, 1891, pp. 397–405.

JOHN B. SMITH. Contributions toward a monograph of the *Noctuidæ* of Temperat North America.—Revision of the species of *Hadena* referable to *Xylophasia* an *Luperina*.

Proc. U. S. Nat. Mus., XIII, No. 839, May 8, 1891, pp. 407–447, plates XXXVI, XXXVII.

ROBERT EDWARDS CARTER STEARNS. Scientific results of explorations by the U. S Fish Commission steamer *Albatross*. No. XVII.—Description of new west Amer ican land, fresh water, and marine shells, with notes and comments.

Proc. U. S. Nat. Mus., XIII, No. 813, September 16, 1890, pp. 205–225, plates XV-XVII.

ROBERT EDWARDS CARTER STEARNS. Notes on the sculpture of American *Limnæa*

Nautilus, IV, No. 11, March, 1891, pp. 121–124.

ROBERT EDWARDS CARTER STEARNS. Edible mollusks, etc. Here and there.

Nautilus, V, No. 1, May, 1891, pp. 2–4.

Comparison of the market mollusks of San Francisco and Rhode Island.

ROBERT EDWARD CARTER STEARNS. Mollusks [of the Eclipse Expedition].

Report of the Smithsonian Institution (U. S. National Museum), 1890 (June 1, 1891). pp. 165-16

A list of the species collected mostly from the west coast of Africa, forming part of the pr liminary report on the collections of the expedition.

LEONHARD STEJNEGER. *Crotalus pyrrhus* in California.

West American Scientist. VII, April, 1891, pp. 165–167.

Gives a full account of the five specimens in the National Museum. the only ones ever co lected of this rare snake.

LEONHARD STEJNEGER. Annotated list of reptiles and batrachians collected by Dr. C. Hart Merriam and Vernon Bailey on the San Francisco Mountain Plateau and Desert of the Little Colorado, Arizona, with descriptions of new species.

North American Fauna, No. 3, September 11, 1890, pp. 103-118, plates xii, xiii.

Describes as new species the following: *Crotaphytus baileyi*, U. S. National Museum, No. 15821; *C. silus*, No. 11790 A; *Uta palmeri*, No. 16002; *U. levis*, No. 11474; *Sceloporus elongatus*, No. 15858.

LEONHARD STEJNEGER. Report on the Department of Reptiles and Batrachians in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 153, 154.

LEONHARD STEJNEGER. Seebohm's "Birds of the Japanese Empire."

The Auk, VIII., January, 1891, pp. 99-111.

A critical review of the above-mentioned work.

Z. L. TANNER and others. Explorations of the fishing grounds of Alaska, Washington Territory, and Oregon during 1888, by the U. S. Fish Commission steamer *Albatross*, Lieut. Commander Z. L. Tanner, U. S. Navy, commanding.

Bull. U. S. Fish Com., VIII, 1888 (1890), pp. 1-95, plates i-xii.

ERNEST E. THOMPSON. The birds of Manitoba.

Proc. U. S. Nat. Mus., XIII, No. 841, May 29, 1891, pp. 457-643, plate xxxviii (with map of Manitoba).

An account of the birds of Manitoba, based on observations by the author and others.

CHARLES H. TOWNSEND. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. No. XIV.—Birds from the coasts of western North America and adjacent islands, collected in 1888-'89, with descriptions of new species.

Proc. U. S. Nat. Mus., XIII, No. 799, Sept. 9, 1890, pp. 131-142.

New species described are as follows: (1) *Speotyto rostrata;* (2) *Zenaidura clarionensis;* (3) *Troglodytes tanneri;* (4) *Puffinus auricularis*, from Clarion Island; (5) *Oceanodroma socorroensis*, from Socorro; (6) *Amphispiza belli cinerea*, from Ballenas Bay, Lower California; (7) *Otocoris alpestris pallida*, from mouth of the Colorado River; (8) *Melospiza fasciata graminea*, from Santa Barbara Island; (9) *Helminthopila celata sordida*, and (10) *Otocoris alpestris insularis*, from San Clemente Island.

CHARLES H. TOWNSEND. Scientific results of Explorations by the U. S. Fish Commission steamer *Albatross*. No. XV. Reptiles from Clarion and Socorro Islands and the Gulf of California, with description of a new species.

Proc. U. S. Nat. Mus., XIII, No. 800, September 9, 1890, pp. 143, 144. Described as a new species, *Uta clarionensis*, U. S. National Museum, Nos. 15904-15908.

FREDERICK W. TRUE. Observations on the Life History of the Bottlenose Porpoise.

Proc. U. S. Nat. Mus., XIII, No. 812, September 9, 1890, pp. 197-203.

FREDERICK W. TRUE. Description of two new species of mammals from Mount Kilima-Njaro, East Africa.

Proc. U. S. Nat. Mus., XIII, No. 814, September 16, 1890, pp. 227-229.

FREDERICK W. TRUE. Description of a new species of Mouse, *Phenacomys longicaudus*, from Oregon.

Proc. U. S. Nat. Mus., XIII, No. 826, November 15, 1890, pp. 303, 304.

FREDERICK W. TRUE. Report on the Department of Mammals in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 139-143.

J. KING VAN RENSSELAER. Playing cards from Japan.

Proc. U. S. Nat. Mus., XIII, No. 836, May 29, 1891, pp. 381, 382.

GEORGE VASEY. Report of the Botanist to the Secretary of Agriculture.

Report of the Secretary of Agriculture, 1890, pp. 375-393.

The report treats of the following subjects: Forage and other experiments; Herbarium; Medical plants; Publications; Report of the Mississippi Experiment Station (by S. M. Tracy); Experiment Station at Garden City, Kansas; Grasses for arid districts; Noxious weeds (by F. V. Coville), with 8 plates.

The following list comprises the plants figured:

Ambrosia trifida.
Hieracium aurantiacum.
Linaria Canadensis.
Cuscuta trifolii.
Plantago lanceolata.
Cenchrus tribuloides.
Pennisetum typhoideum
Eragrostis Abyssinica.

of North American Grasses." Fifty rare grasses from the desert region of the southwest are described and figured.

The following list comprises the grasses figured:

Aegopogon geminiflorus.
Andropogon cirrhatus.
hirtiflorus.
saccharoides.
Wrightii.
Aristida arizonica.
divaricata.
Boutelona arenosa.
aristidoides.
Burkei.
eriopoda.
Harrardii.
hirsuta.
Humboldtiana.
oligostachya.
prostrata.
racemosa.
ramosa.
stricta.
trifida.
Buchloë dactyloides.
Cathestecum erectum.
Cenchrus myosuroides.
tribuloides.
Chloris alba.
ciliata.
Chloris cucullata.
glauca.
verticillata.
Elionurus barbiculmis.
Epicampes macroura.
rigens.
Eremochloe Bigelowii.
Kingii.
Eriochloa sericea.
Heteropogon contortus.
Hilaria cenchroides.
mutica.
Melica diffusa.
Porteri.
Muhlenbergia distichophylla.
gracilis.
Panicum bulbosum.
ciliatissimum.
lachnanthum.
Setaria caudata.
Stenotaphrum Americanum.
Stipa flexuosa.
Thurberia Arkansana.
Trachypogon polymorphus.
Tragus racemosus.

GEORGE VASEY and J. N. ROSE. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. No. XVI. Plants collected in 1889 at Socorro and Clarion Islands, Pacific Ocean.

Proc. U. S. Nat. Mus., XIII, No. 801, September 9, 1890, pp. 143, 144.

GEORGE VASEY and J. N. ROSE. A new Aster from California.

Botanical Gazette, XVI, 1891, p. 113.

Aster Oreuttia is here described and figured.

GEORGE VASEY and J. N. ROSE. List of plants collected by Dr. Edward Palmer in

GEORGE VASEY and J. N. ROSE—Continued.

Houstonia arenaria.
Houstonia brevipes.
Hofmeisteria laphamioides.
Justicia Palmeri.
Krynitzkia peninsularis.
Lycium umbellatum.
Perityle aurea.
Sphæralcea albiflora.
Sphæralcea Californica.
Sphæralcea violacea.
Coultereila n. gen. is figured.

CHARLES D. WALCOTT. Description of new Forms of Upper Cambrian Fossils.

Proc. U. S. Nat. Mus., XIII, No. 820, October 14, 1890, pp. 267–279, pls. XX, XXI.

There is included in this paper the description of a new species of Upper Cambrian fossils and the new genus *Spirodentalium*. The occurrence of the latter and the genus *Conularia* add to the downward range of two types that have hitherto been found only above the Cambrian.

CHARLES D. WALCOTT. The Fauna of the Lower Cambrian or Olenellus Zone.

Tenth Annual Report of the U. S. Geological Survey, 1888–'89 (1890), part I, pp. 509–658. (Colored map, text illustrations, 69 figures, plates XLIII–XCVII).

This is an extended work upon the geological and paleontogical character of the Lower Cambrian terrane of North America.

The scope of the paper embraces (1) a list of titles of the more important books and papers relating to the subject; (2) a historical review of the work on the rocks and fossils now included in the Olenellus zone; and (3) the general results of the study of the fauna by the geologist and paleozoölogist, or its physical and biological history and character as far as known. The geologist considers it as found in certain rocks at a distinct geologic horizon, and studies its geologic relations. The paleozoölogist treats of it in its relations to the animal world, past and present.

Under the section of the Lower Cambrian or Olenellus Zone there is a table showing the classification of the Paleozoic and the subjacent strata, and also one of the detailed classification of the Cambrian group. Part VI deals with the North American continent during Cambrian time, and part VII with the continent of Europe during the deposition of the sediment now forming the Olenellus zone. The geographic distribution of the Cambrian rocks is described in part VIII, and in part IX the relations of the Lower Cambrian fauna to the superjacent faunas are discussed. In the notes on the genera and species reference is made to each genus and species known, and a description given if it has not been published in any of the Geological Survey reports. All of the species are fully illustrated on the fifty-one plates accompanying the memoir. A map illustrating the distribution of the Cambrian strata in North America, and one showing the typical sections of the Cambrian strata in North America, accompany the text.

CHARLES D. WALCOTT. Report on the Department of Invertebrate Fossils (Paleozoic) in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 183–185.

LESTER F. WARD. Report on the Department of Recent Plants in the National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 191–193.

LESTER F. WARD. Ueber die Reste eines Brotfruchtbaums, *Artocarpus Dicksoni*, n. sp., aus den Cenomanen Kreideablagerungen Grönlands; von A. G. Nathorst.

Amer. Jour. Sci., third series, XL, September, 1890, p. 257.

Notice of a paper with the above title in the *Kongl. Svenska Vetenskaps-Akademiens Handlingar*. Bd. XXIV, pp. 1–10, pl. I.

LESTER F. WARD. Tertiare Pflanzen der Insel Neusibirien; von J. Schmalhausen.

Amer. Jour. Sci., third series, XL, September, 1890, pp 257, 258.

Notice of a paper with the above title in *Mém. Acad. Imp. Sci. de St. Pétersbourg*, 7e série, tome XXXVII, No. 5, 1890, p. 22, pl. II.

LESTER F. WARD. La Flora dei Tufi del Monte Somma; by Luigi Meschinelli.

Amer. Jour. Sci., third series, XL, September, 1890, p. 258.

Notice of a paper with the above title in *Rend. R. Accad. Sci. Fis. e Mat. of Naples*, April, 1890. Separate, p. 8.

LESTER F. WARD. Remarks on some fossil remains considered as peculiar kinds of marine plants, by Leo Lesquereux.

Amer. Jour. Sci., third series, XL, September, 1890, p. 258.

Notice of a paper with the above title in *Proc. U. S. Nat. Mus.*, XIII, No. 792, 1890, pp. 5–12, pl. I.

LESTER F. WARD. Origin of the Plane Trees.

American Naturalist (Philadelphia), XXIV, September, 1890, pp. 797–810, pl. XXVIII.

This paper is in the main a review of Prof. Johann Jankó's acticle entitled "Abstammung der Platanen," which appeared in volume XI, No. 4, of Engler's *Botanische Jährbücher*. The chief criticism is directed against the geological arguments of Prof. Jankó, who, moreover, was not acquainted with Mr. Ward's several papers on the origin of the genus *Platanus*.

LESTER F. WARD. Revue des travaux de paléontologie végétale parus en 1888 ou dans le cours des années précédentes, par le Marquis Gaston de Saporta.

Amer. Jour. Sci., third series, XL, November, 1890, p. 422.

Notice of a paper with the above title in the *Revue générale de Botanique*, tome II. Paris, 1890.

LESTER F. WARD. Notes on the Leaves of *Liriodendron*, by Theodor Holm.

Amer. Jour. Sci., third series, XL, November, 1890, pp. 422, 423.

Notice of a paper with the above title in *Proc. U. S. Nat. Mus.*, XIII, 1890, pp. 15–35, plates IV–IX.

LESTER F. WARD. The unearned increment of machine-made wealth.

The True Commonwealth (Washington), I, February, 1891, p. 165.

Remarks at the True Commonwealth Club, January 12, 1891, on Prof. H. C. Adams' paper "Is Civilization Just to the Workingman," in which the expression used as a title was employed and discussed.

LESTER F. WARD. Mind as a social force.

The Cleveland Citizen (Cleveland, Ohio), February 20, 27, 1891, p. 1.

Reprint of "Mind as a Social Factor" from *Mind*, (London), IX, October, 1884, p. 563.

LESTER F. WARD. Handbuch der Palaeontologie herausgegeben von Karl Zittel. II. Abth., Palaeophytologie; bearbeitet von Prof. W. P. Schimper und Dr. A. Schenk. Münster und Leipzig, 1879–1890.

Amer. Jour. Sci., XLI, April, 1891, p. 330.

Brief notice of the above work.

LESTER F. WARD. Monographie der baltischen Bernsteinbäume, von H. Conwentz. Danzig, 1890.

Amer. Jour. Sci., third series, XL, April, 1891, pp. 330, 331.

Notice of the above work.

LESTER F. WARD. Ueber die Fructification von *Bennettites Gibsonianus* Carr., von H. Grafen zu Solms-Laubach. Leipzig, 1890.

Amer. Jour. Sci., third series, XLI, April, 1891, p. 331.

Notice of the above memoir from the *Botanische Zeitung*, Vol. XLVIII.

LESTER F. WARD. Die fossile Flora von Schönegg bei Wies in Steiermark, von C. Ettingshausen. I. Theil, Wien, 1890.

Amer. Jour. Sci., third series, XLI, April, 1891, pp. 331, 332.

Notice of the above memoir from *Denkschr. Wien. Akad.*, Bd. LVII.

LESTER F. WARD. Das australische Florenelement in Europa, von C. Ettingshausen, Graz, 1890.

Amer. Jour. Sci., third series, XLI, April, 1891, p. 332.

Notice of the above memoir.

LESTER F. WARD. Untersuchungen über Ontogenie und Phylogenie der Pflanzen auf paläontologische Grundlage, von C. Ettingshausen and Franz Krašan. Wien, 1890.

Amer. Jour. Sci., third series, XLI, April, 1891, p. 332.

Notice of the above memoir in *Denkschr. Wien. Akad.*, Bd. LVII.

LESTER F. WARD. The transmission of culture.

The Forum, XI, May, 1891, pp. 312–319.

A criticism of the doctrine of Prof. August Weismann that acquired talents are not transmitted through heredity.

LESTER F. WARD. Neo-Darwinism and Neo-Lamarckism.

Proc. Biol. Soc. of Washington, 1891, pp. 11–71.

Annual address of the president of the society, delivered January 24, 1891. A historical and critical review of the modern scientific thought relative to heredity, and especially to the problem of the transmission of acquired characters. The following are the several heads involved in the discussion: Status of the problem; Lamarckism; Darwinism; Acquired characters; Theories of heredity; Views of Mr. Galton; Teachings of Professor Weismann; A Critique of Weismann; Neo-Darwinism; Neo-Lamarckism; The American "School"; Appli-

LESTER F. WARD—Continued.

cation to the human race. In so far as views are expressed, they are in the main in line with the general current of American thought and opposed to the extreme doctrine of the non-transmissibility of acquired characters.

LESTER F. WARD. Report on the Department of Fossil Plants in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 189, 190.

J. ELFRETH WATKINS. The place of the electrical industries in history.

The Electrical World, XVII, No. 9, p. 164.

(Read at the December anniversary meeting of the National Electric Light Association, at Providence, R. I., February 18, 1891.)

A discussion of the place of the electrical industries in history, being a comparison between the recent progress made in the practical application of electricity in the useful arts and manufactures with that made during the last two centuries in the utilization of steam, which, a few years ago, was considered the greatest of the generated forces.

J. ELFRETH WATKINS. Henry's electric motor constructed in 1831.

The Electrical World, May 9, 1891.

Describes one of the earliest electric motors, that designed and constructed by Joseph Henry in 1831, and recites Henry's description of the invention.

J. ELFRETH WATKINS. Report on the Section of Transportation and Engineering in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 107-111.

CHARLES A. WHITE. On the biological and geological significance of closely similar fossil forms.

Proc. Amer. Ass. Adv. Sci., XXXIX, 1890, pp. 239-243.

CHARLES A. WHITE. The Texan Permian and its Mesozoic types of fossils.

Bull. U. S. Geol. Surv., No. 77, March, 1891, pp. 1-51.

CHARLES A. WHITE. A sketch of the scientific work of Prof. A. H. Worthen.

Geol. Surv. of Ill., VIII, January, 1891. pp. 18-37.

CHARLES A. WHITE. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. No. X.—On certain Mesozoic fossils from the Islands of St. Paul's and St. Peter's in the Straits of Magellan.

Proc. U. S. Nat. Mus., XIII, No. 793, July 22, 1890, pp. 13, 14, pls. II, III.

CHARLES A. WHITE. Report on the Department of Invertebrate Fossils (Mesozoic) in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum), 1888 (1890), pp. 187, 188.

HARRIS A. WILDER. A contribution to the anatomy of *Siren lacertina*.

Zoologische Jahrbücher. Abth. f. Anat. und Ontogen. d. Thiere, IV, 1891, pp. 653-696, plates XXXIX, XL.

The greater part of the material was obtained from the National Museum, for which due credit is given.

HENRY S. WILLIAMS. North American Paleontology for 1887 and 1888.

Report of the Smithsonian Institution, 1888 (1890), pp. 261-326.

THOMAS WILSON. [Anthropological notes in the *American Naturalist*.]

Anthropology of the American Association for the Advancement of Science at Indianapolis, XXIV, No. 286, October, 1890, pp. 975-984.

Société d'Anthropologie at Paris, XXV, No. 289, January, 1891, pp. 73-85; February 1891, No. 290, pp. 172-182.

International Congress of Anthropology and Prehistoric Archæology, XXV, No. 292, April, 1891, pp. 387-395.

The Munich Association, XXV, No. 292, April, 1891, pp. 395, 396.

The map of prehistoric Bavaria, XXV, No. 292, April, 1891, p. 396.

The International Congress of Anthropology and Prehistoric Archæology of Paris, 1889, XXV, No. 293, May, 1891, pp. 499-503; No. 294, June, 1891, pp. 587-592.

THOMAS WILSON. Proposed classification of the Section of Anthropology and Prehistoric Archæology at the Chicago Exposition, prepared at the request of its committee.

40 pp., 8vo.

THOMAS WILSON. Glacial phenomena and its relations to the gravel deposits of the Delaware River at Trenton, New Jersey.

International Congress of Anthropology and Prehistoric Archæology. Paris. 1889. 10 pp. 8vo.

THOMAS WILSON. Report on Hygiene and Demography.

Annual Report of the Commissioners of the District of Columbia. 1890–1891, 28 pp., 8vo.

THOMAS WILSON. Address before the Washington Training School for Nurses.

Washington, 11 pp., 8vo.

THOMAS WILSON. The amulet collection of Prof. Belucci, of Perugia, Italy, exhibited at the French Exposition, Paris, 1889. Read at the annual meeting of the American Folk-Lore Society, New York City, November 29, 1890.

Journal of American Folk-Lore, IV, No. 13, April–June, 1891, pp. 144–146.

THOMAS WILSON. The statistics of crime in the United States of North America.

Proceedings of the International Congress of Criminal Anthropology. Paris, pp. 224–229.

THOMAS WILSON. Report on the Department of Prehistoric Anthropology in the U. S. National Museum, 1888.

Report of the Smithsonian Institution (U. S. National Museum). 1888 (1890). pp. 123–138.

WILLIAM C. WINLOCK. Astronomy for 1887, 1888.

Report of the Smithsonian Institution, 1888 (1890), pp. 125–216.

SECTION V.

LIST OF ACCESSIONS TO THE U. S. NATIONAL MUSEUM DURING THE YEAR ENDING JUNE 30, 1891.

LIST OF ACCESSIONS.*

ABBE, Prof. CLEVELAND (See under W. E. Frye; Mr. Seal; The Bishop Taylor Mission).

ABBOTT, W. H. (See under U. S. Fish Commission).

ABOTT, Dr. W. L. (Philadelphia, Pa.). A magnificent collection of spears, shields, bows, swords, wooden dishes, and personal ornaments of the Wa Chaga and Wasai negroes of the Kilima-Njaro region;† specimens of insects, representing all orders; 107 birds' skins, representing about 60 species; specimens of Snakes, *Bucephalus* and *Coluber*, both species of which are undeterminable, and specimens of mammal skins (23656); 79 specimens of mammal skins and skulls,‡ representing 29 species; collection of alcoholic and dry insects, consisting of 10 specimens of lepidoptera and 6 of neuroptera, 10 species of orthoptera, 10 of hemiptera, and 50 of coleoptera, 60 specimens representing 30 species of arachnida, and 18 specimens representing 8 species of myriopoda from Mt. Kilima-Njaro, Seychelles Islands, and Madagascar; 2 specimens of Coco de Mer (*Lodoicea seychellarum* Labil) and 2 pieces of wood of the same; 46 reptiles and batrachians, representing 20 species, from the same localities; 117 birds' skins, representing 45 species, obtained from the same region; 100 African plants and a number of lichens and mosses; 5 eggs of *Anous stolidus* from Isle Siche, Seychelles Islands, and a nest and egg of a small sun-bird, species not determined, from Mt. Kilima-Njaro; 11 shells, representing 3 species, from the Seychelles Islands; collection of ethnological objects (93 specimens in all), including shields, quivers, arrows, models of huts, wooden vessels, wallets, mortar, beehive, war capes, game board, and other articles and utensils; 4 gallinules (24008); photographs taken in East Africa, showing natives, scenery, habitations, and objects representing native life (24334).

ADAMS, C. F. (Champaign, Ill.). Sixteen skeletons of birds and skin of mammal (23432); bird-group composed of shrikes, with nest and young (23622); group of gibbons (*Hylobates* sp.) from Borneo (23890). Purchase.

ADAMS, W. H. (Elmore, Ill.). Two flint scrapers from Peoria County. 23927.

ADAMS, W. W. (Mapleton, N. Y.). Fragment of human skull from an ancient grave in Fleming, Cayuga County. 24206.

AGRICULTURAL COLLEGE (Lansing, Mich.), through Prof. A. J. Cooke. Forty species of North American coleoptera, 17 of which are new to the collection. Exchange. 24941.

AGRICULTURE, DEPARTMENT OF. Twenty-seven photo-lithographs illustrating forest destruction and reforestation in France (23584); section of tulip-tree, with historical chart of events contemporaneous with growth (23585); 2 maps showing forest destruction (23587); 100 label maps showing distribution of species (23589). Deposit.

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*The accessions of the year are included under the numbers 23341–24527.

†This collection is fully described in the catalogue published in Section III of this volume.

‡The mammal specimens of Acc. 23656 are incorporated with those of Accession 24008.

AGRICULTURE, DEPARTMENT OF—Continued.

Through Dr. C. Hart Merriam, chief of Division of Ornithology and Mammalogy. Fossil turtles and mammals in fragmentary condition from Fort Bridger, Wyoming, and pieces of the jaw and radius of bear from a cave in Grant County, New Mexico (23344); 11 land-shells representing 4 species from Texas (23484); 5 horned toads (*Phrynosoma brevirostre douglassii*) from Idaho (collected by Mr. V. Bailey) (23548); two turtles, representing two species (deposit) (23704); Pacific pine Snake (*Pituophis catenifer*) from Marshall, Washington (deposit) (23734); Specimen, in flesh, of Bruennich's Murre (*Uria bruennichii*), from Throg's Neck, Long Island (collected by Mr. A. Ferriera) (23895); 5 species of land-shells (collected by Mr. William Lloyd, of Monterey, Mexico) (24074); 31 reptiles and batrachians, representing 11 species from Idaho (deposit) (24213).*

Through Prof. C. V. Riley, entomologist: Alcoholic insects, mostly coleoptera from southern California (collected by Mr. D. W. Coquillet, of Los Angeles, California) (23916); 382 species of North American lepidoptera and 62 species of European lepidoptera (23934); 54 species of well-mounted coleoptera, some of which are new to the collection (collected by Mr. Coquillet) (23942); 110 specimens of North American coleoptera, representing 54 species new to the collection (collected by H. F. Wickham, of Iowa City, Iowa (23964); 225 species of coleoptera from the United States, 20 species of coleoptera from Mexico, 29 species of hemiptera from the United States and Mexico, 75 species of hymenoptera from the same localities; 4 species of diptera from the United States and 6 specimens of *Vanessa californica* from Idaho (collected by Prof L. Bruner, of Lincoln, Nebr.) (23974); 25 species of North American coleoptera, many of which are new to the collection (24009); 425 specimens, representing 60 species of lepidoptera, and 2,400 specimens, representing 375 species of coleoptera, collected in California and Washington by Mr. A. Koebele, and transferred to the Museum collection by Prof. Riley (24017); 30 species of coleoptera collected in southern California and transferred to the Museum collection by Prof. Riley (24018); 30 species collected and transferred in the same manner (24056); series of 400 species of coleoptera and 130 species of hemiptera (collected by Prof. Bruner in the United States and Mexico) (24136); collection of tineidæ containing 900 specimens, representing about 430 North American species, and 500 specimens, representing about 140 European species (24277). (See under Massachusetts Society for Promotion of Agriculture; Northern Pacific Railroad.)

AIKEN, WALTER (Franklin, N. H.). Two fresh specimens of Golden Trout (*Salvelinus aureolus*). 23725.

ALASKA COMMERCIAL COMPANY (San Francisco, Cal.), through the Quartermaster-General's Department, U. S. A. Bidarka and outfit from Akoutan Island. 23768. (See under Capt. Frank Curling.)

ALDRICH, T. H. (Blocton, Ala.). Ten species of Red Bluff Eocene fossils, named by the describer, Otto Meyer (23408); collection of Tertiary fossils from the southern United States, illustrating the species described by Otto Meyer and for the most part identified by him (23763).

ALFARO, Señor ANASTASIO. (See under Museo Nacional de Costa Rica.)

ALLEGHANY COLLEGIATE INSTITUTE (Alderson, W. Va.), through Mr. H. A. Evans. Skull of a lion cub (*Felis leo*). 24030.

ALLEN, GEORGE A. (United States Indian Agent, Colorado River Agency, Parker, Ariz.). Collection of pressed flowers and plants; 5 alcoholic specimens of *Hadrurus hirsutus* and 6 specimens of *Trombidium* sp.; 4 lizards, representing 3 species, from the Colorado Indian Reservation; 8 ethnological objects and 5 pieces of pottery from the Mojave Indians (24160); 4 photographs of Mojave Indians (24199).

* These are the result of the biological explorations carried on by Dr. Merriam and his assistants in Idaho during the summer of 1890. A separate report has been prepared and has been published in "North American Fauna" No. 5, pp. 109–112.

ALLEN, Dr. J. A. (See under American Museum of Natural History.)

ALMY, THOMAS J. (Salt Lake City, Utah), through Dr. T. H. Bean. Specimen of Grayling (*Thymallus tricolor* var. *montanus*). 24481.

AMERICAN HISTORICAL ASSOCIATION, through A. Howard Clark, Assistant Secretary. Manuscripts, drawings, letters, etc., comprising the "Vail papers," relating to the invention and early application of the telegraph. 24466. Deposit.

AMERICAN MANGANESE COMPANY (Pittsburg, Pa.), through Mr. William Carnegie, Superintendent. Specimens of manganese ore from Crimora, Va. 23770.

AMERICAN MUSEUM OF NATURAL HISTORY (New York city), through Dr. J. A. Allen. Four skins of Chipmunk (*Tamias bulleri* and *Tamias macrorhabdotes*), from Valparaiso, Mexico, and Blue Cañon, California (23418); 2 fresh specimens of Rhesus monkey (*Macacus rhesus*). (23987.) Exchange.

ANDREWS, Dr. E. A. (Johns Hopkins University, Baltimore, Md.). Five hundred specimens, representing 57 species, of annelids from Beaufort, N. C., and Willoughby's Sand Spit, Va., forming the basis of Dr. Andrews' paper* on the *Annelida Polychæta* of Beaufort. 23930.

ANDRUS, W. J. (Hackensack, N. J.). Three eggs of La Fleche fowl (23427); 2 La Fleche fowls (24181); La Fleche pullets (24187, 24303).

APPLETON, NATHAN (Boston, Mass.). Six photographs of Indians. 24212.

ARCHER, JAMES R. (Mattapony, Va.). Specimen of tetradymite from the Whitehall Gold Mine, Spottsylvania County. 23569.

ARMSTRONG, F. B. (Brownsville, Tex.). Two skins of Ferruginous Pygmy Owl (*Glaucidium phalænoides*), and 4 skins of Texan Screech Owl (*Megascops asio mecallii*). 24432.

ARNHEIM, J. S. (San Francisco, Cal.). Specimens of *Cancellaria crawfordiana* and albino land-shells. 24416.

ARNOLD, Hon. DELOS (Pasadena, Cal.). Collection of Pliocene and Postpliocene fossils from San Pedro. 24112.

AVERY, S. P. (New York city, N. Y.). Fifty-one etchings, lithographs, etc. 24342.

AVERY, Dr. WILLIAM C. (Greensboro, Ala.). Two eggs of Carrion Crow (*Catharista atrata*) (24207); egg of Chuck-will's Widow (*Antrostomus carolinensis*) (24332); nest and 4 eggs of Orchard Oriole (*Icterus spurius*) (24463). (See under Dr. J. M. Pickett.)

AYRES, H. B. (Department of Agriculture). Seven specimens of ores of iron and manganese from Minnesota and Dakota. 24327.

AYERS, H. D. (Northern Pacific Junction, Minnesota). Specimen of plumose muscovite. 24149.

BABSON, Col. J. W. (U. S. Patent Office). Patent granted to John W. Bronaugh and Jesse Talbot for a refrigerator, March, 1813, signed by James Madison, President, and James Monroe, Secretary of State. 24429.

BACHE, RÉNE (Washington, D. C.). German beer mug. 23973.

BAGSTER, C. B. (Vineland, N. J.). Matrimony vine (*Lycium vulgare*) and spider (*Acrosoma spinea* Hentz.) of the family *Epeiridæ* (23515); Ant lion from Florida (24383).

BAILEY, H. W. (Newport News, Va.). Eight specimens of *Cychrus elevatus* and 2 specimens of *Carabus serratus*. 23772.

BAILEY, L. W. (See under University of New Brunswick.)

BAILEY, S. H. (Washington, D. C.). Grooved stone hammer from the bank of Park River, N. Dak. 23786.

BAILEY, V. (See under Department of Agriculture, through Dr. C. Hart Merriam.)

BAKER, Dr. FRANK. (See under Hon. J. O. Kerby, and M. J. Griffith.)

BAKER, MARCUS (U. S. Geological Survey). Twenty-eight specimens of *Helix thyroides*, from Washington, D. C. 23624. (See under E. W. Boker.)

*Published in Proceedings of the National Museum, Vol. XIV, pp. 277–302.

BALFOUR, HENRY (The Museum, Oxford, England). Models of shell-lamps from the southwest coast of Brittany, Orkney, and Shelter Islands, and French crusie from Normandy (exchange) (23783); 2 iron lamps used by bakers for lighting ovens, a spoon made of a pecten shell, and commonly used by the fishing people on the south coast of Brittany (exchange) (24290); 4 sections of Asiatic compound bows (gift) (24331). (See under Oxford Museum.)

BANKS, NATHAN (Department of Agriculture). Ten species of coleoptera, including a specimen of *Zacotus matthewsii* (collected by Mr. Trevor Kincaid, of Olympia, Wash.) (23932); 20 species of arachnida, all new to the collection (24082).

BARBER, A. W. (Orlando, Fla.). Clay from the intestines of an alligator; 6 fragments of pottery from Fort San Luis, 3 miles from Tallehassee*, conglomerate, and fossil shells. 24356.

BARR, L. (See under Singer Manufacturing Company.)

BARROWS, Prof. W. B. (Department of Agriculture). Blotched King-snake (*Ophibolus rhombomaculatus*), from Brookland, D. C. (23648); snake from same locality (24214). (See under.)

BARTLEMAN, R. M. (Secretary of United States Legation, Caracas, Venezuela), through Prof. O. T. Mason. A fine series of *Argonauta argo* and other marine shells (23956); small pottery vase from the island of Gran Roque, stone implement or ornament from a cave in the Cordillera of Merida, Venezuela, small polished hatchet and 2 stone chisels (23968); specimens of insects (24210); shells from Cumana, salt from Salt Lakes at Cumana, alcoholic specimen of snake from Caracas, 2 gourds and pieces of pottery (24216); Cicadæ used for medicinal purposes, and other insects (24351).

BARTLETT, EDWARD (Museum, Maidstone, Kent, England). Fifty-one specimens, representing 38 species, chiefly of *Fringillidæ*, from various localities. 23837.

BARTLETT, Dr. JOHN. (See under Capt. W. P. Nichols).

BASSETT GEORGE W. (Mattowoman, Md.). Rhinoceros beetle (*Dynastes titus*). 23399.

BATCHELDER, C. F. (Cambridge, Mass.). Collection of reptiles, chiefly from Massachusetts. 24057.

BATES, ELWYN (Whitman, Mass.), through Mr. L. O. Howard. Lepidoptera collected in Nevada and Louisiana. 23492.

BATES, H. W. (See under Royal Geographical Society, London, England.)

BATES, S. C. (See under J. Owens Berry.)

BATTLE, H. B. (Director of the North Carolina Agricultural Experiment Station, Raleigh, N. C.). Piece of meteorite from Henry County, Va., weighing 30½ grammes. 23639.

BAXTER, Mrs. J. H. (Washington, D. C.). Thirty-seven specimens of ancient Peruvian pottery, collected by Mr. William Tryon and presented to Gen. Baxter by Mr. Tryon.† 24195.

BAYLEY, WILLIAM (Washington, D. C.), through Thomas Marron. Specimen of Leach's Petrel (*Oceanodroma leucorhoa*). 24440.

BEALES, E. V. (Denver, Colo.). Phyllopod crustacean, genus *Apus* from Colorado. 23538.

BEAN, BARTON A. (U. S. National Museum). Alcoholic specimens of fishes collected by Mr. Bean, Mr. William P. Seal and party, in Chesapeake Bay, September 16–19, 1890, as follows: *Tetrodon, Monacanthus, Alutera, Aphoristia, Achirus, Paralichthys, Hypleurocheilus, Tautoga, Gerres, Orthopristis, Chætodipterus, Serranus, Pomatomus, Lagodon, Diplodus* (2 species), *Tylosurus, Hemirhamphus, Menidia, Fundulus, Mugil, Scoliodon, Raia, Rhinoptera*, etc., alcoholic specimens of birds from Cape Charles, and Gull (*Larus atricillus*) (23573); *Rana virescens*, from Cape Charles, Virginia, and specimen of Cuttle-fish from the same locality (23596).

* San Luis is an old Spanish outpost, "Doctrina," and was the scene of a battle in 1708.

† This collection is exhibited and known as the "Tryon Collection."

BEAN, Dr. T. H. (See under Thomas J. Almy, Frank W. Sparks.)

BEATH, J. W. (Philadelphia, Pa.) Two specimens of pyrite cut from ring-stones from the coal mines, Schuylkill County, Pa. (gift) (23442); 9 specimens of minerals, consisting of axinite, fowlerite, willemite, franklinite, garnet, niccolite, monazite, calcite, and quartz; 13 cut stones, comprising 2 specimens of chrysoberyl, 3 of tourmaline, 6 of chrysolite, 1 of almandite, and 1 of oligoclase (24360); 15 intaglios of bloodstone, agate, carnelian, sardonyx, and labradorite (24363). Purchase.

BECK, ROLLO H. (Berryessa, Cali.) Skin of a new species or subspecies of Sharp-tailed Finch (*Ammodramus becki*) from California. 24471.

BECK, W. H. (Washington, D. C.) Vanadinite from Rothschild mine, Beaver Head County, Mont. 24492.

BECKER, Dr. GEORGE F. (U. S. Geological Survey). Two specimens of iridosmine from California. 24170. (See under Interior Department; U. S. Geological Survey).

BEEBE, EUGENE (Montgomery, Ala.). Iron pick and specimens of calcareous sandstone and sulphide of iron (pyrite) in which the pick was found embedded 18 feet deep. 23470.

BELDING, L. (Stockton, Cala.). Four skins of Belding's Spermophile (*Spermophilus beldingi*). 23533.

BELL, Dr. J. B. (Eagle Rock, Va.). White-pine trunk with inarched branch illustrating natural grafting. 24296.

BELL, WILLIAM (Philadelphia, Pa.). Photographic instantaneous shutter of 1859. 23422.

BEMENT, C. S. (Philadelphia, Pa.). Manganite from Ilefeld, Hartz, Germany. 24438.

BENEDICT, J. E. (Smithsonian Institution). Skin of Red-tailed Hawk (*Buteo borealis*) from Bull's Island, Calibogue Sound, South Carolina (23961); 140 specimens of birds' skins, representing 50 species, from South Carolina* (23991); coiled asket made by the negroes of North Carolina, interesting as a traditional survival of African handicraft (24238).

BENDIRE, Capt. CHARLES E. (See under Dennis Gale, Dr. C. Hart Merriam, Dr. William L. Ralph, and O. B. Zimmerman).

BERDAN, Col. C. H. (Washington, D. C.). Berdan rifle and metallic cartridge 24188. Deposit.

BERRY, J. OWENS (Ash Grove, Va.), through S. C. Bates. Pileated Woodpecker (*Ceophlæus pileatus*) in flesh. 23883.

BETHUNE, Rev. J. S. (See under Prof. J. B. Smith).

BEVILL, Dr. CHEVES (Winfield, Ark.). Larva of Royal Walnut-moth (*Citheronia regalis*), collected by Mr. R. F. Payne (23403); carved stone pipe (catlinite), jasper bead from a mound near Winfield, and specimen of caterpillar (23608); arrowheads, polished hatchets, grooved axes, pierced tablet, fragments of pottery, piece of cretaceous limestone, fossil shell *Exogyra costata*, and fragment of *Lepidodendron*, probably *Lecylostigma*, from Scott County (24494).

BIBBINS, R. K. (Wilton Center, Ill.). Shells. (23419, 23539.)

BILLINGS, L. G. (U. S. Navy). Collection of bird's skins made by Mr. Billings during the recent cruise of the *Pensacola* to Africa. The collection also includes some specimens from St. Helena. 23341.

BINNEY, W. G. (Burlington, N. J.). Collection of slugs, types of descriptions by the donor, forming a supplement to the Binney collection of land-shells. 23843.

BISHOP, W. L. (Kentville, Nova Scotia, Canada). Thirteen specimens of eggs of *Dendragapus canadensis*. 23558. Purchase.

BLACK, J. L. (See under Magnetic Iron and Steel Ore Company, Blacksburg, S. C.).

*An exceedingly acceptable collection, containing 5 specimens, representing a species of *Cistothorus mariannæ* Scott, entirely new to the collection, as well as others which were poorly represented, and many of importance for comparison and locality.

BLACKFORD, Hon. E. G. (New York City). Tail of Sturgeon (*Acipenser*) from Sandy Hook, New Jersey (23423); fresh specimens of Trigger-fish (*Balistes vetula*) (23496). Albino Brook-trout (*Salvelinus fontinalis*) from Lackawaxen Creek, Wayne County, Pa. (24230).

BLAKE, Lady EDITH (King's House, Jamaica, West Indies), through Dr. A. S. Gatschet. Drawings of emblems of the Red Indian mythology, and a water-color plate of Beothuck Indian ornaments. 23591.

BLOUNT, HENRY F. (Evansville, Ind.), through O. F. Jacobi. Small model plow. 23873.

BLOUNT, N. F. (See under Moses Eames).

BLUNCK, A. E. (Johnstown, N. Y.). Black-breasted game fowls. (24159. 24215.)

BOAS, Dr. FRANZ (Bay Center, Wash.). Ten ethnological objects from Cape Flattery. 23490.

BOEHMER, GEORGE H. (Smithsonian Institution). Spider (*Argiope riparia* Hentz) (23454); 885 official seals of foreign governments and institutions (23975).

BOKER, E. W. (Washington, D. C.), through Mr. Marcus Baker, of the U. S. Geological Survey. Common Marmoset (*Hapale jacchus*). 24312.

BOLLES, Lieut. T. DIX (U. S. Navy). Ethnological objects, 64 shells, sea-urchins, corals, echini, and sponge, canoe and fittings from Samoa (23392); Samoan and English Dictionary (1862); Ie Sina or white mat, Titi or leaf-girdle, Asoa or necklace, Selu or comb, Fow or Ava strainer, piece of Ava root, Ete or baskets, Uatogi or clubs, bundle of Salui or cigarette wrappers, bundle of limed hair, tototise-shell ring inlaid with silver, shell used with bonito line as a decoy bait (24120); Tapa-cloth from Marshall Island, basket and gold mat from Samoa, and fire-bowl from Japan (24121).

BOLLMAN, C. H. (See under U. S. Fish Commission.)

BOLTON, Dr. H. C. (University Club, New York City, N. Y.). Three photographs of Hawaiian surf-boards and surf-board riding. 23813.

BONAPARTE, Prince ROLAND (Paris, France). Fifty photographs of Somalis and 14 of Hotentots of Africa, forming a part of the great anthropological collection, portions of which he has sent in former years. 24177.

BOND, L. J. (Washington, D. C.). Two specimens of gold in quartz from Old Maryland Mine, Montgomery County, Md. 23937.

BOSWELL, HENRY (Washington, D. C.). Red carrier pigeon (23549); Black-barb pigeon (24301).

BOTANIC GARDEN (Trinidad, West Indies), through J. H. Hart, superintendent. Specimen of a newly discovered deposit of foraminiferous earth, "Phillipine deposit," from Naparima district, Trinidad. 23402.

BOURKE, Capt. JOHN G. (U. S. Army). Stone headed war-club of the Dakota Indians, obtained from "Fog Whirlwind," one of the warriors of "Sitting Bull" band, made while those Indians were fugitives in Canada (deposit) (24113); ethnological specimens from Arizona and New Mexico, and stone implements, comprising axes, hammers, rubbing-stones, etc., from the same locality (24142); collection from cliff ruins and pueblos in Arizona and New Mexico, embracing textile fabrics, birds' bones, obsidian flakes, basket work, flint and obsidian arrow points, grooved and polished axes, rubbing-stones, paint-mullers, and other articles and utensils (24169); Mesquite beans used as food at Fort Ringgold (24443); sling used by the Indians of the State of Hidalgo, Mexico (deposit) (24483).

BOWMAN, Col. J. B. (Little Rock, Ark.) Manuscripts, deeds, books, and miscellaneous relics pertaining to the pioneer history of the Shenandoah Valley and Kentucky. 23947. Deposit.

BOYD, Hon. S. H. (United States consul, Bangkok, Siam). Playing-cards used in Siam for gambling, and a set of dice. 24478.

BOYD, WILLIAM J. (Brooklyn, N. Y.), through Prof. O. T. Mason. Model of the vessel *Half Moon*. 24243.

BOYLE, C. B. (U. S. National Museum). Silver-mounted flute made by Laurent, of Paris, and presented to President James Madison in 1813. 23906.

BRADY, J. C. (Wheeling, W. Va.,) through Mr. William Hallock, of the U. S. Geological Survey. Carbon deposited from natural gas. 24411.

BRADY, J. H. (Education office, Cape Town, South Africa). Collection of insects, representing 167 species. 23982. Exchange.

BRADDY, E. L. (Mitchell, Ga.). Indian pipe. 23824. Purchase.

BRAVERMAN, M. (Visalia, Cal.). Vertebra of Rattlesnake (*Crotalus lucifer*) from Tulare County. 24223.

BRECKINRIDGE, Hon. WILLIAM C. P. (See under Mrs. Edward Troye).

BREWSTER, WILLIAM (Cambridge, Mass.) Spruce trunk from Maine, containing excavations of Pileated Woodpecker (23742); 3 specimens of Lower Californian Wood Pewee (*Contopus richardsonii peninsulæ* Brewst.); a recently described subspecies, new to the collection (24119).

BRIMLEY, H. H. & C. S. (Raleigh, N. C). Twenty-four batrachians, representing 11 species, among which is a fine series of what is believed to be Holbrooke's "*Salamander haldemanni*," a form apparently lost sight of since its original description (gift) (23943); 24 living Salamanders (purchase) (24247); skins of Gray Squirrel (*Sciurus carolinensis*,) Flying Squirrel (*Sciuropterus volucella*), Cotton Rat (*Sigmodon hispidus*), Field Mouse (*Hesperomys leucopus*), Golden Mouse (*Hesperomys aureolus*), and (*Hesperomys palustris*) (purchase.) (24271.)

BRINTON, Mrs. EMMA S. (Washington, D. C.) Pottery lamp of green glaze from Tunis, North Africa. 24064. Exchange.

BRISTOL, Prof. CHARLES L. (Vermillion, S. Dak.). Catlinite pipe and stem. 23544.

BRITISH MUSEUM (London, England), through Mr. Augustus P. Ready. Fifteen hundred and sixty-two reproductions of ancient gold and silver coins (purchase), (23349). Twelve specimens of minerals from England and Scotland, consisting of fluorite, galena, pearlspar, celestite, calcite, barite, witherite, and brewsterite (exchange). (23532). Through Dr. A. Güenther. Collection of marine invertebrates and mollusks obtained from Australia, West Indies, Japan, South America, Hawaiian Islands, Portugal, Scotland, and islands of the Pacific and Indian Oceans during the voyage of H. M. S. *Challenger* (exchange). (23665). Through Mr. Charles H. Read. Twenty-three ethnological specimens from Kafirland, South Africa (exchange). (23892).

BRITTS, Dr. J. H. (Clinton, Mo.). One hundred and fifty specimens of Carboniferous fossil plants representing about 35 species from the vicinity of Clinton (24043); fossil plants (24294).

BRONSON, H. C. (Brandon, Vt.). Eight samples of mineral paints from Crown Point Mineral Paint Company. 23407.

BROWN, ARTHUR (U. S. National Museum). Hognose-snake (*Heterodon platyrhinus*) from the District of Columbia. 23705.

BROWN, CHARLES F. (Hot Springs, Ark.). Wavellite from Mount Ida, Montgomery County, Ala., and a crystal of yellow topaz from Brazil (23593); novaculite and albite with quartz (23652); distorted quartz crystal and mica on quartz from Saline County, Ark. (24319).

BROWN, HERBERT (Tucson, Ariz.). Egg of *Colinus ridgwayi*, new to the collection, and 11 eggs (one set) of *Callipepla squamata* (23914); skin of Boucard's Sparrow (*Peucæa ruficeps boucardi*) from Arizona (23970); 24 eggs of *Callipepla gambeli* (24071); skin of Snake, *Rhinocheilus lecontei* (24192); alcoholic specimen of Worm-snake (*Stenostoma humile*) (24346); 9 eggs (one set) of *Callipepla gambeli*, found in a nest of Palmer's Thrasher, four and a half feet from the ground, in a Cholla cactus, with a nest and 4 eggs of *Pipilo fuscus mesoleucus* (24403); 3 rare Worm snakes (*Stenostoma humile*) (24412).

BROWN, R. W. (Washington, D. C.). Weathered shale found in Monmouth County, N. J. (23972); Land snail (*Helix aspersa*) found in a bunch of bananas, probably from Jamaica (24197).

BROWN, SEVELION A. (See under Department of State.)

BROWN, W. A. (See under W. E. Frye).

BROWN, W. Q. (Riddle's, Douglas County, Oregon). Nickel ore concentrates. 24066.

BRUNER, Prof. L. (See under Department of Agriculture, and under Prof. C. V. Riley.)

BRYAN, O. N. (Marshall Hall, Md.). One hundred and sixty-four stone relics from Charles County, consisting of hammer-stones, grooved axes, polished hatchet, paleolithic implements, rude notched implements, arrow and spear-points, pierced tablet, stone slab with mortar-shaped cavities, fragment of a potstone vessel and fragment of pottery. 23379.

BUCHANAN, WILLIAM. (See under New York Central and Hudson River Railroad Company.)

BUCK, CHARLES M. (See under University of Pennsylvania.)

BULL, Master E. (Brookland, D. C.), through Dr. Leonhard Stejneger. Living specimen of rabbit (*Lepus sylvaticus*). 23574.

BULLMAN, CHARLES (Plainfield, N. J.). Piece of barkcloth called *damaqua*, made by the Indians of Choco, United States of Colombia, phosphates of alumina and iron found on the island of Grand Connetable, 18 miles southeast of Cayenne, French Guiana, little seed paint-pot used by the Choco Indians to hold red paint made from anatto seeds, piece of lignite from gold and platinum alluvia, Condoto River, Choco, and gold and platinum from Condoto River, Province of San Juan, United States of Colombia. 23612.

BÜRGI BROTHERS (Rochester, N. Y.). A lately completed relief map of Palestine. (deposit.) 24475.

BURKET, H. F. (Findlay, Ohio). Plaster cast of flint arrow-point found in Hancock County, formerly occupied by the Wyandotte Indians. 24514.

BURNS, FRANK (U. S. Geological Survey). Collection of fresh-water mollusks from the Potomac River (23354); bunch of oysters found on an old coffee-mill, and a bunch attached to the neck of a whisky bottle (23912); specimen of cotton bagging, manufactured from "Leaf Fiber" obtained from the needles or leaves of *Pinus palustris* Miller, or the long-leaved pine, at or near Wilmington, N. C. (23955); specimen of carpeting or matting also manufactured in the same manner (24020). (See under D. T. McMillan.)

BURNS, W. R. (Concord, Ky.). Arrow-head and fossil, Silurian (Cincinnati formation), *Calymene senaria* (23886); 18 stone implements consisting of arrow and spear-points, tablet (natural formation slightly modified), a sinker, and a small pendant or ornament from Lewis County (24032).

BUTLER, A. W. (Brookville, Ind). Alcoholic specimens of *Physa heterostropha* Say, from a lake near Lake Valley, New Mexico. 24266.

BURT, W. S. (Youngstown, Ohio). Fossil fruits (*Trigonocarpus Dawsoii* L. & H.) 23514. Exchange.

BURY, JOHN. (See under Bureau of Ethnology, U. S.)

CAIRNS, J. S. (Weaverville, N. C.). Nest of *Buteo latissimus*. 23425.

CALDER, Rev. WILLIAM CAREY (Crozer Theological Seminary, Chester, Pa.). One-anna piece, 2-anna piece (2 specimens), 8-anna piece and a Rupee, representing 5 silver coins of Burmah. 24309.

CALIFORNIA STATE MINING BUREAU (San Francisco, Cal.). Two specimens of tiemannite in quartz, specimens of native antimony, auriferous feldspar, auriferous calcite and jasper, variscite, and 2 samples of ores from California, Nevada, Mexico, and Honduras. 24323. Exchange.

CALVERLEY, WILLIAM (Barnegat, N. J.). Trumpet-fish (*Fistularia tabaccaria*). 23673.

CAMERON SILICA COMPANY (South Beddington, Me.), through C. E. Mitchell, superintendent. Specimens of silica as it comes from the deposit, and after it has been prepared. 24015.

CAMPFIELD, C. H. (Magdalena, New Mex.). Chrome iron ore. 23979.

CANDLER, Hon. J. W. (See under George H. Draper.)

CARNEGIE, WILLIAM. (See under American Manganese Company.)

CARPENTER, C. C. (See under J. L. Cheyney.)

CARPENTER, Cap. W. L. (U. S. Army, Madison Barracks, Sackett's Harbor, N. Y.). Alcoholic specimen of large Sucker (*Catostomus cypho*) from Verde River, Arizona, and 3 alcoholic specimens of snakes (23723); 4 eggs and nest of *Spizella socialis arizonæ*, 4 eggs and nest of *Chondestes grammacus strigatus*, 3 eggs and nest of *Vireo huttoni stephensi* (?), 2 nests of *Psaltriparus minimus*, and 4 eggs and nest of *Icterus bullocki* (24389); 3 eggs (one set) of *Harporhynchus crissalis*, 3 eggs (one set) of *Habia melanocephala*, 2 eggs of *Mimus polyglottus*, 2 eggs and nest of *Icterus cucullatus nelsoni*, 6 eggs and 2 nests of *Chondestes grammacus strigatus*, (24424); nest and egg of Black-chinned Hummingbird (*Trochilus alexandri*), nest and 3 eggs of Western Wood Pewee (*Contopus richardsoni*), nest and 6 eggs of Lead-colored Bush-tit (*Psaltriparus plumbeus*), nest and 4 eggs of Woodhouse's Jay (*Aphelocoma Woodhousei*), and 4 eggs of Spurred Towhee (*Pipilo maculatus megalonyx*) (24476); 2 sets of eggs, 4 specimens and nest of *Zenaidura macroura*, nest and 2 eggs of *Contopus richardsoni*, nest and egg of *Spizella socialis arizonæ*, and nest and egg of *Trochilus alexandri* (24499).

CARROLL, WILLIAM C. (Virginia Beach, Va.), through Mr. Frederick W. True, U. S. National Museum. Specimen of *Siren lacertina* from a fresh water pond near Dam Neck Mills, Life Saving Station, Princess Anne County, Va. 24061.

CARTER, Miss MARIAN H. (Blowing Rock, N. C.). Flint core from Grandmother Mountain, North Carolina. 23567.

CARTER, WILLIAM J. (Washington, D. C.), through Prof. O. T. Mason. Sheet of the log-book of the Egyptian steamer *Dessomig*. 24063.

CHAMPNEY, J. WELLS (New York city, N. Y.). Two parts (series 3 and 4) of "New England Scenery from Nature," Boston, 1852. 24292.

CHANDLER, Prof. C. F. (Columbia College, New York city, N. Y.). Nine specimens of photo-mechanical process work. 23928.

CHASE, GEORGE S. (Washington, D. C.). Forty-five specimens of minerals, consisting of selenite, jasper-agate, moss-agate, moss-opal, galena, celestite, fibrous gypsum, aragonite crystals, native silver, cerargyrite, sphalerite on chert, wavellite, azurite, and pyromorphite from Kansas and other localities. 23796. Purchase.

CHATELAIN, HÉLI (Vineland, N. J.). Sechuana Bible (Pentateuch) used by Dr. David Livingstone in his journey from Cape of Good Hope to Loanda, Africa, in 1852, with autograph of Dr. Livingstone on the first page (gift) (23393); African collection of rocks, shells, fossil-plants, bats, (including *Phyllorhina commersoni*), and birds (*Buphaga africana* and *Totanus*), Lizard (*Varanus niloticus*), alcoholic specimens of insects from St. Thome and Angola, alcoholic specimens of crab and star-fishes from St. Thomas, birds' nests, fungus, *Polyporus Linhartii*, and reptiles (gift) (23400); skull of Hippotamus (*H. amphibius*) from Angola, Agrica, 2 specimens of coffee, one of cocoa beans and one of Manioca, collection of ethnographical objects from the native tribes of Angola, and 43 copper coins of Portugese Africa and Azores Islands (gift) (23435); medicine-horns, apparatus for money-belt making, spoon, medicine image, musical instruments, tobacco, pair of slippers, love handkerchief from Angola, Africa (purchase) (24070); skin of crocodile from West Africa (purchase) (24162); specimen of hair from the head of a McBamba negro (gift) (24190); wooden spoon, wooden "idol" (Wzambi) and loin cloth from the Mbaka tribe of Angola (gift) (24258).

CHEESEMAN, JAMES. (See under Deerfoot Farm Company.)

CHENEY, Mrs. EDNAH D. (Jamaica Plain, Mass.). Wood engraving, "portrait of Seth Wells Cheney," by G. Kruell (23699); proof of "Portrait of John Cheney" engraved by S. A. A. Schoff (24216).

CHENEY, S. F. (See under Dr. C. Hart Merriam.)

CHERRIE, GEORGE K. (Museo Nacional, Costa Rica). Egg of *Vireo flaviviridis* from San José, new to the collection (24067); skeleton of Owl (*Megascops nudipes*) (24150); 73 birds' skins representing 22 species, all of which are valuable (24154). (See under Museo Nacional, San José, Costa Rica.)

CHEYNEY, Judge J. L. (Fort Dodge, Iowa), through Hon. C. V. Carpenter and Hon. J. P. Dolliver. Silver watch carried by Thomas Cheney, of Pennsylvania, during the Revolutionary War. 23841.

CHRISTY, THOMAS & CO. (London, England). Sample of the fruit of Kola, and two beans, one from the west coast of Africa. 23537.
23537.

CHURCHILL, WILLIAM (Washington, D. C.). Four examples showing method of tying square-knot netting. 23676.

CINCINNATI MUSEUM ASSOCIATION (Cincinnati, Ohio), through J. H. Gest, assistant director. Ethnological specimens selected from the Congo collection of Carl Steckelman, in the Cincinnati Museum Association. 24469. Exchange.

CLARK, A. HOWARD. (See under American Historical Association).

CLARK, EDWARD (Washington, D. C.). Original full-size plaster model of the statue of Liberty, by Thomas Crawford, used in making the mold in which the bronze statue was cast, now surmounting the Capitol dome. 23834.

CLARKE, J. M. (See under Prof. O. A. Derby).

CLARKE, Miss MARY E. (Chambersburg, Pa.). Hand-made terra cotta bottle-vase, decorated with applied vine leaves and grapes in relief. 23680.

CLARKE, Miss UNA H. (Washington, D. C.). Commission of J. B. Smith as notary public, signed by Governor Marcus Morton, of Massachusetts, in 1825, and a commission to him signed by Governor Levi Lincoln in 1828. 23946.

CLARKE, W. EAGLE (Edinburgh Museum of Science and Art, Edinburgh, Scotland). Eleven birds representing 9 species from England, Azore Islands, Siberia, and Japan. 23671. Exchange.

CLEVELAND, R. M. (Marietta, S. C.). Specimen of polycrase. 24387.

CLINE, GEORGE W. (Tampa, Fla). Phosphate rock. 24095.

COCHOWER, GEORGE F. (See under White River Quarry Company.)

COLBY, Gen. L. W. (Beatrice, Nebr.). Portion of the skull and horncore of *Bison latifrons*; a fossil from Withlacoochee River, Florida. 24052.

COLLETT, Dr. ROBERT (Director of the Zoölogical Museum, Christiania, Norway). Skeleton of Porpoise (*Lagenorhynchus albirostris*). 24236. Exchange.

COLLINS, G. F. and COOK, O. F. (Syracuse, N. Y.). Types of North American *Geophilidæ* mounted on eight microscopic slides. 23854.

COMSTOCK, F. M. (Le Roy, N. Y.), through Forest and Stream Publishing Company. Brook-trout (*Salvelinus fontinalis*), from Caledonia Creek, New York. 24477.

CONDON, Prof. T. (Eugene City, Oregon). Five fresh-water mollusks representing two species of fossils from the tertiary of Oregon. 23693.

CONVERSE, I. C. (Sandwich, Ill.). Cast of stone ax from La Salle County, Ill. 24054. Exchange.

COOK, O. F. (See COLLINS, G. F.)

COOKE, Prof. A. J. (See under Agricultural College, Lansing, Mich., and Department of Agriculture.)

COOKE, Dr. CLINTON T. (Salem, Oregon). Two eggs of Puget Sound Screech Owl (*Megascops asio saturatus*), new to the collection. 24184.

COPE, Prof. E. D. (Philadelphia, Pa.). Two obsidian points from the "Equus beds" near Silver Lake, Oregon. 24358.

COQUILLET, D. W. (See under Department of Agriculture.)

CORY, C. B. (Boston, Mass.). Forty birds' skins representing 25 species, chiefly from the West Indies. 23846.

COTTOM, CHARLES W. (Dunbar, Pa.). Piece of charcoal taken from the "Hill Farm Mine," 1,500 feet from the mouth of the pit. 24125.

COUES, Dr. ELLIOTT (Washington, D. C.). Specimen of Tinamou (*Eudromias elegans*). 24140.

COULSON, Capt. W. C. (U. S. Revenue Marine Service). (See under Treasury Department, U. S. Revenue Marine.)

COX, ARTHUR M. (Chicago, Ill.). Twenty-seven birds' skins representing 21 species. 24080.

COX, Mrs. C. C. (Washington, D. C.). Two eggs of Australian Emeu. 23728.

COX, PHILIP (Newcastle, New Brunswick, Canada). Four species of fishes, consisting of *Catostomus teres, Semotilus bullaris, Cranidea boleoides*, and *Notropis megalops*. 23708.

COX, Mrs. S. S. (New York City, N. Y.), through Mr. W. V. Cox. Large framed photographs of the late Hon. S. S. Cox. 23383.

CRAMER, G. (St. Louis, Mo.). Daguerreotype of Daguerre. 23473.

CRESSON, Dr. HILBORN T. (Philadelphia, Pa.). One thousand one hundred and twenty-eight archæological objects collected by Messrs. William Reilly and F. G. Smith, at the mouth of the "Ancient Aboriginal Fish-weirs" inside the mouth of Naaman's Creek, near Claymont, Del., and 5 specimens from the cavern of Le Moustier, France (deposit) (23766); five hundred and thirty-six archæological objects from Delaware, Pennsylvania, and East Tennessee (gift) (24318).

CROCKETT, D. F. (Bridgeport, Conn.). Two pieces of Zanzibar gum. 23771.

CROSBY, C. H. (Bridgeport, Conn.). Partridge Cochin fowl. 23765.

CROSBY. F. W. (Washington, D. C.), through the Quartermaster's Department, U. S. Army. Geological material from Mexico, New Mexico, and Texas (gift) (24310); rocks from California (purchase) (24372); geological material from California (gift) (24524).

CROSBY, Prof. W. O. (Boston, Mass.). Two samples of nickel ore from Sudbury, Ontario, Canada (23746); 3 specimens of nickeliferous pyrohatite from Dracut, Mass. (24088). Exchange.

CROSS, WHITMAN. (See under Interior Department, U. S. Geological Survey.)

CROUCH, R. B. (Chicago, Ill.) Sample of rock salt from Kingman, Kans. 23951.

CUFFY, JOSIAH (Fort Monroe, Va.). Spanish silver dollar of 1806, 5-centime nickel piece of Switzerland of 1850, 10 pfennig of Germany of 1876, English shilling of 1874, 25 cents of Canada of 1872, 10 reis Spanish coin, 14 copper coins and tokens of the United States and England. 23919.

CULIN, STEWART (Museum of Archæology and Paleontology, University of Pennsylvania, Philadelphia, Pa.). Set (5 pieces) of apparatus for playing fan-tan, set of dice, knuckle-bones of sheep (primitive dice used in gambling), spirit-cups, marbles, and bundle of slow matches from China (exchange) (24314); 2 packs of Austrian and Belgian playing-cards, bought in Beirut, Syria, and 2 packs from Philadelphia, 1857, early type, and New York and Philadelphia, first "double headers" (gift) (24402).

CURLING, Capt. FRANK, through Capt. S. A. Day, U. S. Army, Port Mason, San Francisco, Cal., and Alaska Commercial Company. Dugout found by Capt. Curling, of American ship *Joseph S. Spinney*, about 210 miles off the Pelew or Baloa Islands, in the western Pacific Ocean (23888).

CURTIS, WILLIAM E. (Department of State). Album of portraits of the officers and members of the International American Conference, held at Washington in 1889–1890 (23364); photograph of Carib relics from St. Vincent 24379.

DALL, Mrs. C. H. (Washington, D. C.). Auriferous black sand from the coast of Mendocino County, Cal. (23633).

DALL, WILLIAM H. (U. S. Geological Survey). Fresh-water shells from California and Oregon (23689); specimen of *Acridium americanum* from the District of Columbia (23748); 2 specimens of *Chernes* sp., taken from the house-fly (23819); specimens of *Aspergillum vaginiferum* Lam., *Strombus fasciatus*, *Bulimus Marielinus*, and *Bulla* sp., from the Indo-Pacific Ocean and Florida (23978); turban from Bombay (24401).

DANA, GEORGE H. (Washington, D. C.). Land-locked Salmon (*Salmo salar sebago*), 20 inches long, from St. John Lake, Quebec, Canada 23452.

DANIEL, Dr. Z. T. (Cheyenne River Agency, South Dakota). Forty stone implements, teeth, and pottery found in remains of Indian houses, represented by circular mounds from 10 to 50 feet in diameter with depressed centers.* Collected at the suggestion of Indian Commissioner T. J. Morgan (23444); pair of tweezers from the Sioux Indians, and an arrow-head from the Arickarees, South Dakota (23489); tobacco pouch made by Sioux Indians from the skin of foetal deer, and the marrow bones of an antelope, showing the Indian method of extracting marrow (23675); bones of Sioux Indians and buffalo horns found on the site of an ancient burial-place on the Missouri River near the Cheyenne River Agency (24013; pipe of natural wood made by the Sioux Indians (24167); piece of red pipestone, engraved on each side and edge (24244); 6 scrapers, 3 arrow-heads, and 4 broken pieces or chips from the ruins of houses formerly occupied by the Ree Indians, and 3 flint scrapers found on the ground of the agency (24449); flint scraper found near Fort Bennett, South Dakota (24495); portion of a gun found by an Indian on the Custer battlefield in 1880 (24526).

DANTAGNAN, J. D. (New Orleans, La.). Crab (*Platyonichus ocellatus* Latreille), commonly known as the "Lady Crab" or "Sand Crab," caught in the Gulf of Mexico. 24513.

DAVIS, JOHN P. (New York City, N. Y.). Two signed proofs on Japan paper from wood-engravings made by the donor. 23994.

DAWSON, J. WILLIAM (McGill University, Montreal, Canada). Eight photographs of carboniferous batrachians. 24362.

DAY, Dr. DAVID T. (U. S. Geological Survey). Silicon made by electrolysis from quartz, by the Herault Aluminum Company of Boonton, N. J. (24100); corundum from Shimersville, Pa., and diaspore from Chester, Mass. (24392).

DAY, Capt. S. A., U. S. Army (see under Capt. Frank Curling).

DEERFOOT FARM COMPANY (Southboro, Mass.), through James Cheesman). Old original centrifugal separator, erected on the Deerfoot Farm in 1879. 23774.

DELANEY, JAMES M. (Rochester, N. Y.). Specimen of *Hystricia abrupta* Wied. (23429); specimens of *Pupa badia* from near Erie Canal, N. Y. (23581).

DENISON, D. A. (Washington, D. C.). Thoroughbred Italian greyhound. 24373.

DERBROW, GEORGE W. (Indio, Cal.), through Mr. C. R. Orcutt. Two alcoholic specimens of Rattlesnake (*Crotalus cerastes*) from near Salton, Cal. 24321.

DERBY, Prof. O. A. (Brazil, South America), through Prof. J. M. Clarke, University of the State of New York. Thirty-seven specimens, representing 5 genera, 14 species, and 1 variety from the Devonian group of Brazil, consisting of *Proetus pullinus* Clarke, *Cryphæus paituna* H. & E., *Homalonotus acanthurus* Clarke, *Homalonotus ciara* Hartt & Rathbun, *Homalonotus derbyi* Clarke, *Phacops brasiliensis* Clarke, *Phacops menurus*, *Phacops macropyge* Clarke, *Dalmanites tumilobus* Clarke, *Dalmanites gemellus*, *Dalmanites australis* Clarke, *Dalmanites scirpus* Clarke, *Dalmanites maccurua* Clarke, *Dalmanites maccurua* var. *Dalmanites gales* Clarke. 23682.

DEVOE, F. W., & Co. (New York City, N. Y.). Eleven bladders containing oil colors, as formerly put up for artists' use. 24269.

DE WERTHEIM, A. T., & SON (San Luis Potosi, Mexico). Collection of topaz crystals. 24276.

* These houses were inhabited by the Rees (Arickarees of the Pawnee family).

DEY, FREDERICK M. (Franklin, N. H.). Two fresh specimens of Golden-trout (*Salvelinus aureolus*). 23725.

DICKERSON, MAX E. (Shelby, Ohio). Photograph of Sitting Bull's war-cloak. 23721.

DIETZ, O. (New York City, N. Y.). Fifteen species of coleoptera, of which 7 are new to the collection. 23963.

DILLER, Prof. J. S. (U. S. Geological Survey). Two specimens of conglomerate, one from near the Point of Rocks and the other from near Leesburg, Va. (24143); 2 specimens of conglomerate from near Point of Rocks, Md. (24164).

D'INVILLIERS, EDWARD V. (Philadelphia, Pa.). Phosphates from the island of Navassa, West Indies. 23901.

DODGE, BYRON E. (Richfield, Mich.). Stone axe with handle, red stone pipe, and an arrow-head from Genesee County, New York. 24272.

DODGE, O. G. (U. S. Navy). (See under Interior Department. U. S. Geological Survey.)

DODGE, Col. W. C. (Washington, D. C.). Collection of breech-loading firearms and other projectile weapons, numbering 70 specimens (24171); patent granted to Alexander Melville Clark by the English Government in 1877, and an assignment of the patent to Watson Kerr in 1877 (24430). Loan.

DODSON, Rev. WILLIAM P. (See under The Bishop Taylor Mission.)

DOLLIVER, Hon. J. P. (House of Representatives). Fragment of meteorite from Winnebago County, Iowa. 23449. (See under J. L. Cheyney.)

DOUGAL, WILLIAM M. (Georgetown, D. C.). Drawing of a powdering box for laying a dry aquatint ground. (23691). Purchase.

DOWLING, THOMAS, jr. (Washington, D. C.). Four swords and a fireman's brass trumpet (23809); cast of large quartzite implement found near Cabin John's Bridge (23989); two engravings of the Tartar Wars, China (24134).

DRAPER, GEORGE H. (Paris, France), through D. S. Lamson, of Weston, Mass., and Hon. J. W. Candler. Account book of Royal Treasurer under Louis XV, for the year 1768, signed by Louis XVI, March 28, 1780. 23428.

DRESSLER, Rev. S. G. (Oriental, Pa.). Chrysalis of Milk-weed butterfly (*Danais plexippus*) found in a potato field, suspended from the leaf stem of a potato vine. 23555.

DUFOUR, Dr. F. (Washington, D. C.). Broad-winged Hawk (*Buteo latissimus*) in the flesh, from Paint Branch, Maryland (23565); Barred-owl (*Syrnium nebulosum*) in the flesh, from Riverdale, Md. (23577).

DUFOUR, Dr. T. F. R. (Washington, D. C.). Skin of Ani (*Crotophaga ani*) from Navassa Island, West Indies. 23808.

DUGÈS, Prof. A. (Guanajuato, Mexico). Specimens of *Rhodinocichla schistacea* from southern Mexico (23478); skin of the rare *Picolaptes leucogaster* from Micoachan, Mexico (24288); skin of Ferruginous Pigmy-owl (*Glaucidium phalænoides*) from Vera Cruz (24423).

DURAND, John (Paris, France). Two Chaldean figures cast from the original in the Louvre. 23788. (See under Charles Gindriez).

DURY, CHARLES (Avondale, Ohio). Fifty-seven specimens mostly of coleoptera representing 27 species. 24473. Exchange.

EAKINS, L. G. (See under Interior Department. U. S. Geological Survey.)

EAMES, MOSES (Watertown, N. Y.), through Mr. N. F. Blount, of Washington, D. C. Plow made by Col. William Lord in 1820. This plow was awarded a premium at the Jefferson County Fair, held the same year, for the best machine manufactured. 23969. Deposit.

EDWARDS, HENRY (New York City, N. Y.). Alcoholic specimen of Lesser Dormouse-phalanger (*Dromicia concinna*) from western Australia, 3 alcoholic specimens, representing 3 species of reptiles from Australia, South America, and Florida; alcoholic insects from Florida; spiders, scorpions, myriopoda, and larvæ from Argentine Republic, and spiders from Australia, dry specimens of sponges, crabs, and starfishes from New Zealand. 23891.

EDWARDS, H. W. (Philadelphia, Pa.). Egg of red and blue Macaw parrot (*Ara macao*). 24350.

EINSTEIN, Col. S. (Poundmaster, Washington, D. C.). Greyhound, for skeleton. 23482.

ELLIOTT-PALMER (Messrs. Henry W. Elliott and William Palmer, Washington, D. C.). Three hundred and nine specimens of birds' skins, representing 45 species, chiefly from Unalaska and the Pribyloff Islands, Alaska, 16 skins of Foster's Shrew (*Sorex fosteri*), 5 skins of common mouse, *Mus musculus*, 7 skins of Arctic Fox (*Vulpes lagopus*), 6 skins of Spermophile (*Spermophilus empetra*), 6 skins of Fur Seal *Callorhinus ursinus*, and 3 skins of head of same, from Alaska; *Lepidopsetta*, *Pollachius*, *Chirolophus* juv., *Trichodon*, *Cottus*, *Gasterosteus*, *Laparis*, *Hexagrammus*, and *Squalus acanthias* from St. Paul Island, Alaska, crustaceans, sponges, echinoderms, worms, ascidians, and actinians from St. Paul Island and Unalaska; birds' skeletons, volcanic breccia, iron sand concretion around grass roots, gold ore, marine and fossil shells, birds' nests and eggs, plants, insects, and sinews of animals used for thread (23646), skin and skull of Steller's Sea-lion (*Eumetopias stelleri*), from Alaska. (23851).

ELLIS, JOHN F., & Co. (Washington, D. C.). Dulcimer. 23894. Purchase.

ELY, THEO N. (general superintendent, motive power, Pennsylvania Railroad, Altoona, Pa). Car wheel of the same class of wheels in use under the first locomotive and cars run on the New Jersey Railroad, and similar to those used under the cars when they were drawn by horses, prior to the use of the locomotive. 23835.

EMERY, EDWARD C. (San Diego, Cal.). Specimen of *Tegrodera erosa* Lsc. 24405.

EMERY, JOHN N. (Northville, Mich.). Indian tomahawk. Deposit. 24467. Returned.

EMERY, W. E. (Kansas City, Mo.). Polished section of Ammonite. 24179.

ENGEL, L. (New York City, N. Y.). Candle-holder used by miners in Leadville, Colo., and book used by the Mormons in Utah (gift) (24128); buffalo robe, 2 blankets, pair of buckskin pants, bucksin jacket, pair of schacks, and a bag (purchase). (24232).

ENGLE, HORACE M. (Roanoke, Va.). Five specimens of tscheffkinite from Bedford County, Va. 24842.

ENGELHARDT, F. E. (Syracuse, N. Y.). Oak branch with leaves covered with galls of *Holcaspes centricola* O. S. 23446.

ENGLISH, GEORGE L., & Co. (Philadelphia, Pa.). Seventeen specimens of minerals from various localities, consisting of fluorite, jadite, bloodstone, calcite, amethyst, apophyllite, hyalite, topaz, pickeringite, allanite, eudialyte, and garnet (23694); pyromorphyte, pyrargyrite, pink grossularite, hyalite, calcite, apophyllite, opal-agate, opal, fluorite, laurionite, allenmontite, cassiterite, green tourmaline, barite, hematite, cuprite, bournonite (24375). Purchase.

ERVING, R. M. (Intervale, N. H.). Distorted white pine found on the southwestern slope of Bartlett Mountain. 23845.

ESSEX INSTITUTE (Salem, Mass.), through Dr. Henry Wheatland, president. Photograph of an original box of lucifer matches. 23981.

ESTES & LAURIAT (Boston, Mass.). Blind impression from an etched plate, with two duplicates. 23715.

ETHNOLOGY, BUREAU OF, under the direction of the Smithsonian Institution (through Maj. J. W. Powell, Director). One thousand two hundred and nineteen ethnological and archæological objects collected by Messrs. William H. Holmes, H. L. Reynolds, F. D. Snyder, Charles Miller, Thomas Harper, and John Bury. 24012.

EVANS, H. A. (See under Alleghany Collegiate Institute.)

EVERMANN, Prof. B. W. (Greencastle, Ind). Collection of fishes from the Bay of Guaymas, Sonora, Mexico, made in 1887 by Profs. B. W. Evermann and O. B. Jenkins, including types of *Rhinoptera steindachneri*, *Menidia clara* and *Upeneus rathbuni*.* 23988.

EWART, Hon. H. G. (House of Representatives). Specimen of auerlite from Henderson County, N. C. 23561.

* Published in proceedings of the U. S. National Museum, Vol. XI, 1888, pp. 137-158.

FAHRION, G. W. (Columbus, Ohio). Ten rude stone implements from near Columbus, 4 pieces of bone, piece of mica, and piece of flint from a mound near Upper Sandusky, Ohio. 23831. Deposit.

FALCONER, J. M. (Brooklyn, N. Y.). Collection showing various ways of putting up colors for the use of artists, and a Chinese artist's brush (24252); 5 kinds of tools and materials of various kinds used by artists (24452).

FARRER, W. J. (See under H. Henry Heathcote.)

FARRINGTON, O. C. (Fair Haven, Conn.). Cordierite gneiss from Guilford, Conn. 23859. Exchange.

FAUNTLEROY, W. H. (Bakersfield, Cal.). Gypsum, cement-rock, and clay. 24455.

FERNOW, Dr. B. E. (U. S. Department of Agriculture). View of avenue of Japanese cedar (*Cryptomeria Japonica*) (24335); model of tree-planting machine invented by Mr. Thomas L. Stratton. (25336.) Deposit.

FERREIRA, A. (See under Department of Agriculture, through Dr. C. Hart Merriam.)

FERRY, Mrs. C. M. (Oneida, N. Y.). Plants from South Africa. 24307. Exchange.

FERSINGER, JOHN (Washington, D. C.). Yellow fantail pigeon for skeleton. 23563.

FESLER, BERT. (See under U. S. Fish Commission.)

FICK, G. A. (Baltimore, Md.). Spangle-winged Swallow-pigeon. 24422.

FINCH, J. MILTON (Dayton, Ohio). Segments of crinoid column. 23917.

FIRST JAPANESE AND TRADING COMPANY (New York City). Collection of wood and ivory carvings, bronzes, costumes, and other articles. 23887. Purchase.

FISH, CHARLES F. (Fall River, Mass.). Photographs of the old stone mill at Newport, R. I., and one of the windmill in Portsmouth. 23421.

FISH COMMISSION, U. S.

Through Col. Marshall McDonald, Commissioner: Small collection of brachyuran crustaceans obtained by the schooner *Grampus* during the winter of 1888–'89, off the coast of Florida (23487); alcoholic collection of type series of fresh-water fishes collected during the summer of 1889 in Missouri, Arkansas, Colorado, Utah, Georgia, and Alabama, by Prof. S. E. Meek, Dr. D. S. Jordan, C. H. Bollman, B. Fesler, and others (23493); 28 specimens of fishes collected by the steamer *Albatross* on the Pacific Coast of North America during 1889, being the types of 16 of the new species recently described by Prof. Charles H. Gilbert in the Proceedings of the National Museum (23787); fresh specimen of Rainbow Trout artificially colored at Bucksport, Me., and 2 fresh specimens of the Black-fin Whitefish collected in Miltona Lake, Minnesota, by Mr. James R. B. Van Cleane, Trout (*Salmo trideus*) and Whitefish (*Coregonus nigripinnis*) (23811); collection of 60 species of fishes from the vicinity of Charles City, Va., obtained by Mr. William P. Seal, during September and October, 1890 (23900); 1,128 specimens of brachyurans and anomouran crustaceans, representing 38 species, collected by the steamer *Albatross*, on the Pacific Coast of North America (23904); 327 specimens, representing 15 species of duplicate echini, obtained from the collections of the steamer *Albatross* in the North Pacific Ocean in 1888 and 1889 (24036); collection of fishes representing 90 specimens, made by the steamer *Albatross* from the Galapagos Islands and Panama, during the spring of 1888 (24037)*; 163 specimens of mollusks, collected by the Fish Commission schooner *Grampus*, off the west coast of Florida during the spring of 1889 (24038); a large collection of fishes made by the steamer *Albatross* on the cruise from Norfolk to San Francisco in 1877–'88, mainly from Brazil, but a few from Patagonia and the Straits of Magellan (24039)†; fishes and reptiles from Alabama, obtained by Messrs. P. H. Kirsch, and party in May, 1889 (24047); collection of fishes made in Georgia in

*For lists of specimens with descriptions of new species, see "Proceedings, U. S. National Museum," Vol. XII, pp. 149–183, and Vol. XIII, pp. 449–455.

†For list of species obtained and new forms described, see "Proceedings U. S. National Museum," Vol. XIII, pp. 313–336.

FISH COMMISSION, U. S.—Continued.

1889, by Messrs. C. H. Bollman and Bert Fesler (24048); small collection of fishes consisting of *Halichœres radiatus*, *Lutjanus analis*, *Malthe radiata*, *Eulamia limbata*, and *Lepomis pallidus*, made by Dr. J. A. Henshall in 1889 (24049); collection of fishes from the Gulf of Mexico, made by the schooner *Grampus* in 1889 (24098); 447 crabs belonging to the genus *Panopeus* collected during recent years by the Fish Commission (24280); 2,179 specimens of brachyurans, representing 23 species obtained partly from the dredgings of the steamer *Albatross* in the Pacific Ocean and partly from the Atlantic coast (24517).

Through Mr. W. H. Abbott: Specimens of a small variety of barnacle found attached to rushes growing on the shore of Clear Water Harbor, Florida (24141).

FISHER, ADAM (Moorefield, W. Va.). Oriskany sandstone containing fossils. 23908.

FISHER, WILLIAM H. (Baltimore, Md.). Long-billed Marsh Wren (*Cistothorus palustris*) in the flesh, from Black River, Maryland. 24454.

FITZHUGH, D. H. (Bay City, Mich.). Trout-perch (*Percopsis guttatus*) from the mouth of the Saginaw River. 23935.

FLECHTER, VICTOR S. (New York City). Viola d'amour from Germany, Hurdy-Gurdy and Kit from London (purchase) (23899); 2 photographs (back and front view) of Paganini violin, made by Guarnerius, now on exhibition at Genoa, Italy (gift) (23938).

FLETCHER, Dr. R., Army Medical Museum. (See under Lieut. R. H. Fletcher, U. S. Army.)

FLETCHER, Lieut. ROBERT H. (U. S. Army). Gaming-sticks used by the Hupa Indians of California (23829), through Dr. Robert Fletcher, Army Medical Museum, dance-stick, 2 arrows, photograph of "White Deer Dance" of the Hupa Indians (24368).

FLETCHER, S. M. (Lima, Ohio), through Hon. S. S. Yoder. Oil-sand rock from the Union Oil Company, well No. 9, on the Barse Track, McKean County, Pa., obtained from a depth of 1,730 feet. 24109.

FLOWER, Hon. ROSWELL P., M. C. (House of Representatives). Old iron axe, English penny of 1734, brass button, brass arrow-point, 27 stone arrow-points, and stone tablet found near the ruins of Fort George, New York. 23547.

FOLGER, Commander WILLIAM L. (U. S. Navy). (See under Navy Department, Bureau of Ordnance.)

FOOTE, A. E. (Philadelphia, Pa.). Thirty-one minerals from various localities, consisting of calcite, apophyllite, native sulphur, smithsonite, serpierite, hydrozincite, thulite, pyrite, hematite, senarmontite, and 3 cup opals (24370); 28 minerals consisting of hematite, valentinite, nadorite, apatite, cerussite, scorodite, adamite, scheelite, glauberite, hedenbergite, apophyllite, and calcite. (24434). Purchase.

FOREST AND STREAM PUBLISHING COMPANY (New York City). Two alcoholic specimens of *Lepomis cyanellus* from Argentine, Mich., and *Caranx* sp. from an unknown locality. 23495. (See under F. M. Comstock.)

FORRESTER, R. (Scofield, Utah). Fossil shell, *Goniobasis macilenta* White, from the Laramie Group, Iron County, Utah. 24295.

FORWOOD, Dr. W. H., U. S. Army (Soldiers' Home, Washington, D. C.). Sphene crystals, from Bridgewater, Delaware County, Pa., crystal of selenite from Ellsworth, Ohio, and 4 specimens of quartz from Crystal Mountain, near Hot Springs, Ark. 23865.

FOSTER, F. D. (Norwalk, Ohio). Forty-two photographs of Zulus, copied from pictures brought by Mr. and Mrs. Richards from Zululand. 23602.

FOSTER, Mrs. R. A. (New York City, N. Y.). Sword presented to Albert H. Foster in 1862, by Company D, Twenty-fifth Regiment Massachusetts Volunteers, of which he was a member. 24418.

FOWKE, GERARD (Sidney, Ohio). Quartz gorget and an arrow-shaft rubber, from Monongahela City, Pa.; large, rude, chipped implements and 2 small flints of peculiar forms, from Flint Ridge, Licking County, Ohio; perforator, from Ripley, Ohio, and a hematite cone from Augusta, Ky. 23599. Purchase.

FOWLER, JOHN J. (Washington, N. C.). Miocene fossils from Wilmington, N. C. (collected by Mr. Fowler). 24076.

FRANCIS, JOSEPH (Minneapolis, Minn.). Silver medal of Franklin Institute, Pennsylvania, presented to Mr. Francis in 1854;" gold medal, from Ferdinand II, King of Sicily; silver medal, a decoration of the Société Générale des Naufrages, France; insignia of the Order of St. Stanislaus, presented by the Emperor of Russia. 23360.

FRAZER, GEORGE B. (West Medford, Mass.). One hundred and fifty-eight stone implements from Blackman's farm, Blackmans Point, at the mouth of Cut River, Marshfield, Mass. 23756. Exchange.

FREY, S. L. (Palatine Bridge, N. Y.). Collection of archæological objects, consisting of a hammer-stone, 3 pieces of flint rudely chipped, 69 fragments of pottery and fragments of animal bones, shells, and other specimens. 23437. Exchange.

FRIEDENWALD, Dr. H. (Baltimore, Md.). Piece of cloth stamped in Hebrew intended for a bag to contain the Phylactery (23413); 17 photographs of Jewish synagogues. (23474.) Purchase.

FRITILLARIA CLUB OF YAKIMA VALLEY (North Yakima, Wash.), through Mrs. S. E. Steinweg, president. Collection of botanical specimens. 23871.

FROST, L. L. (Susanville, Cal.). Stone mortar, found 6 feet below the surface near Honey Lake, obsidian point with shoulders on one side, from the bank of the Susan River, 2 obsidian arrow-points from near Susanville, perforated stone tablet found 6 feet below the surface with remains of human skeleton, 2 round pebbles, and a flint perforator from Snake Creek, Nevada. 23441.

FRY, C. W. (Luckett's Virginia). Barn Owl (*Strix pratincola*) in the flesh. 23885.

FRYE, W. E. (Royal Observatory, Cape Town, South Africa), through Prof. Cleveland Abbe and W. A. Brown. Small series of antelope horns (23467); specimen of asbestus from Orange River, Mount Hopetown; Iceland spar from Van-Rhyn-Dorf, west coast; pierced stone—Bushman's club-head or sling-stone—found near Cape Saint Francis lighthouse, South Africa; skull of Tiger (*Felis pardus*) from Cape Leopard, Hamansdorp, and a small gourd used as a whistle. (23670.)

FULTON, HUGH (South Kensington, London, S. W., England). Eight fresh-water and marine shells representing 7 species (purchase) (23491); 15 specimens of shells. Exchange. (24444.)

GALE, DENIS (Gold Hill, Colo.), through Capt. Charles E. Bendire. Four birds' skins representing 3 species from Colorado (23909); 4 eggs (1 set) of *Accipiter cooperi*, 5 eggs of *Colymbus nigricollis californicus*, 5 eggs of *Fulica americana*, 4 eggs of *Recurrirostra americana*, 4 eggs of *Phalaropus tricolor*, 4 eggs and nest of *Empidonax pusillus*, 4 eggs and nest of *Empidonax hammondi*, 3 eggs and nest of *Geothlypis trichas occidentalis*, 4 eggs and nest of *Certhia familiaris montana*, 3 eggs and nest of *Spizella socialis arizonæ* (23913).

GARBUTT, GEORGE (New York City, N. Y.). Two specimens of asbestus from the "Queen of the Hills" mine, Bradford, Logan County, Idaho. 23919.

GARDNER, J. (Savannah, Ga.). White albino Rice-bird. 23516.

GARNER, R. L. (See under Johannes Marjenhoff).

GARWOOD, SPENCER (Milford Center, Ohio). Shrew (*Sorex* sp.) 24282.

GATSCHET, Dr. A. S. (See under Lady Edith Blake.)

GEAR, Hon. JOHN H. (Burlington, Iowa). Crinoid from the Lower Carboniferous, Keokuk Group, near Keokuk, Iowa. 23342.

GEARE, R. I. (U. S. National Museum). Larva of *Calosoma*, probably *scrutator*, of the family *Carabidæ*. 23606.

GENTH, Dr. F. A. (Philadelphia, Pa.) Specimen of monazite sand from Caravellas, Brazil. 24468.

GEOLOGICAL SURVEY OF SWEDEN (Stockholm, Sweden). One hundred and nine specimens carrying 22 genera and 44 species of Cambrian fossils. 24324. Exchange.

GERRARD, E. Jr., (London, England). Two skeletons of Sand-grouse (*Pterocles arenaria*) and one of Cormorant (*Phalacrocorax carbo*). 23958. Purchase.

GEST, J. H. (See under Cincinnati Museum Association.)

GHISELIN, Miss HATTIE V. (Louisville, Ky.). Broken pottery from New Mexico. 23621.

GIBBONS, Dr. W. P. (Alameda, Cal.). Several specimens of *Pholas Pacifica*. 23464.

GIEBNER, R. E. (Sandy Lake, Pa.). Specimen of Puff-ball (*Lycoperdon giganteum*). 23818.

GINDRIEZ, CH. (Director of the Museum, Châlon-sur-Saône, France), through John Durand. Impression from a heliograph "Portrait of Cardinal d'Amboise," from an engraving by Briot, made by Joseph Nicephore Niepce in 1824. 23426. Exchange.

GLASER, PETER (Reading, Pa.). Specimens of ocher from Neversink Mountain. 23451.

GODDING, MCBEAN & CO (Lincoln, Cal.). Samples of pottery clays. 24439.

GODFREY, R. W. (Washington, D. C.) Eight hair-balls taken from the stomachs of cattle. 23967.

GODFREY, T. S. (Knoxville, Tenn.). Fossiliferous marble. 24522.

GONDER, W. T. (Yuma, Ariz.). Beetles representing 2 species, *Cyllene antennatum* and *Trogosita virescens*. 24010.

GOODE, Dr. G. Brown (Assistant Secretary, Smithsonian Institution). Works of Seneca, Voltaire, and the "Orlando Furioso" of Ariosto (deposit) (23531); two Shoshone and Omaha Indian arrows from Colorado and Nebraska (gift) (23552); copy of "American Fishes" (23678, 23718).

GOODE, Mrs. G. BROWN (Lanier Heights, Washington, D. C.). Black Langshan fowl (23374); Silver spangled Hamburg fowl (23749.

GOODWIN, Dr. F. H. (Tucson, Ariz.), through Mr. P. L. Jouy. Carved stone plaque dug from an old Indian grave on a bluff-bank of the San Pedro River, Cochise County, Ariz. 24231.

GORDON-CUMMING, ALASTAIR P. (Washington, D. C.). Feather head-dress worn by the Cinghalese, Island of Ceylon. 24122.

GORHAM, Rev. H. S. (Dartford, Kent, England). Thirty specimens representing 19 species of named coleoptera from Asia and Africa. 23965.

GORING, CHARLES B. (Cincinnati, Ohio). Two specimens of *Linaria vulgaris* var. *peloria* from Hamilton County. 23636.

GRANIER, EMILE (Atlantic City, Wyo.). Nine lithographs from "The Aboriginal Portfolio," by J. C. Lewis, of Philadelphia, 1835. (23944); suit of Sioux clothing from the Upper Missouri River, bow and quiver, leggins, moccasins, and shirt. (24505).

GRANITE RAILWAY COMPANY (Boston, Mass.), through Mr. H. E. Sheldon, agent. Granite stringer from the old track of the Granite Railway at Quincy, Mass. 23684.

GREEGOR, I. (Jacksonville, Fla.). Nails from the ruins of the old Spanish Cathedral in St. Augustine (23821); girdled pine showing course of sap, from near Jacksonville (23897); shells from Great Harbor, Bahama Islands (24093); specimens of *Sigaretus maculatus* and *Sigaretus perspectivus* from the Bahamas (24446).

GREEN, F. C. (Chihuahua, Mexico). Nine specimens of birds' skins, including Vermilion Flycatcher (*Pyrocephalus mexicanus*), Cassin's Kingbird (*Tyrannus rociferans*) and Longtailed Chat (*Icteria virens longicauda*). 23623. Exchange.

GREEN, Prof. H. A. (Chester, S. C.). Ores from South Carolina. 24117. (Exchange.)

GREENWOOD, G. G. B., (Minerva, Ohio). Sandstone concretion found in the Canal Dover gravel pit, Tuscarawas County, Ohio, by Mr. W. R. Tarbet. 23497.

GRIDER, RUFUS A. (Canajoharie, N. Y.). Water-color sketches of one hundred and thirty specimens of powder horns. 24045. Loan.

GRIFFIN, Miss M. E. (Smithsonian Institution). Bullfinch (*Pyrrhula pyrrhula*). 23471.

GRIFFITH, M. G. (Washington, D. C.), through Dr. Frank Baker. Egg and embryo Snake, *Coluber guttatus*. 23486.

GRINNAN, A. G. (See under Miss Bessie C. Grinnan.)

GRINNAN, Miss BESSIE C. (Madison Mills, Va.), through A. G. Grinnan. Plants. 24131.

GÜENTHER, Dr. A. (See under British Museum, London, England).

GUILDHALL LIBRARY COMMITTEE OF THE CITY OF LONDON (London, England), through Mr. Charles Welch, librarian. Six bronze medals issued by the Corporation of the city of London, and commemorating the Visit of Queen Victoria to Guildhall, 1837, Passing of the Reform Bill, 1832, Opening of the London Bridge (large), Opening of the London Bridge (small), Thanksgiving for the Recovery of the Prince of Wales at St. Paul's, and the Opening of the City of London School. 24176.

HAGEN, Dr. I. (Trondhjem, Norway). Collection of Norwegian mosses and two pamphlets. 23778. Exchange.

HALE, Dr. E. M. (Enterprise, Fla.). Five specimens of viviparous Minnows (*Mollienesia latipinna*) from a saline spring. 24089.

HALES, HENRY (Ridgewood, N. J.). Pair of rose-combed white Dorking fowls. (24033); silver-gray Dorking fowl in flesh. (24229.)

HALLOCK, CHARLES (New York City, N. Y.). Two specimens of *Limax maximus* Linr. 23465.

HALLOCK, WILLIAM. (See under J. C. Brady.)

HANFORD, F., Lieut. Commander U. S. Navy. (See under Dr. Hugh M. Smith.)

HANLY, E. F. (Bozeman, Mont.), through Mr. F. H. Knowlton, U. S. Geological Survey. Specimen of *Platysamia columbia* Sm. 24442.

HARDY, MANLY (Brewer, Me.). Nest of *Carpodacus purpureus*. 23424.

HARGROVE, J. O. (U. S. National Museum). Specimen of *Dynastes tityus*. 23377.

HARLSON, ROTHO (Sappington, Me.). Wood-carving done by termites found in the cañon of the Jefferson River at the camp of Green and Keefe, railroad contractors, of Helena, Mont. 23769.

HARPER, THOMAS. (See under Bureau of Ethnology, United States.)

HARRIS, J. G. (Moncton, New Brunswick). Two specimens of kerosene shale from Rockland, New Brunswick. 24268. Exchange.

HARRISON, C. A. (Bridgeport, Conn.). Two pieces of Zanzibar gum. 23771.

HARRISON, WILLIAM H. (Woodbridge, Va.). Green Heron (*Butorides virescens*) in the flesh. 23368.

HART, J. H. (See under Botanic Garden, Trinidad, West Indies.)

HART, WILLIAM H., & Co. (New York city, N. Y.). Skin of a Baboon (*Cynocephalus porcarius*) and skin of a South American monkey (*Lagorthrix cana*). 24209.

HART, WILLIAM R. (Camanche, Iowa). Three specimens of manganese—oxide dendrite—one specimen found near Camanche, and two from near Silver Cliff, Colo. 23733.

HARTLEY, J. SCOTT (New York city, N. Y.). Photograph of Edwin Booth as "Brutus," photographs of Judge Noah Davis and John Gilbert (gift) (23524); life-sized busts of Judge Noah Davis, Edwin Booth, Lawrence Barrett, and John Gilbert (exchange) (23570).

HARTWELL, Mrs. F. M. (Washington, D. C.). Foot stove belonging to David Randall, used in the "Old Red Meeting House" in Dutchess County, N. Y., in 1788. 24399.

HASKELL, Col. E. H. (Boston, Mass.). Official souvenir programme of the Twenty-fourth National Encampment of the Grand Army of the Republic, Boston, Mass., August, 1890. 23526.

HATCHER, J. B. (New Haven, Conn.). Six specimens of fossil plants from the Laramie Group. 23855.

HAWKES, Gen. BENJAMIN F. (Washington, D. C.). Eskimo snuff-bag, made from the foot of an Albatross. 23530.

HAWKINS, BUNTING (Bordentown, N. J.). Satinette pigeons, in flesh. (23590, 23750.)

HAWKINS, W. B. (Washington, D. C.). Luna moth. 23412.

HAWLEY, F. S. (Broadalbin, N. Y.). Dulcimer. 23822.

HAY, ROBERT (Junction City, Kans.). Specimen of halite from Kingman Salt Mine, Kingman, Kans. 23701.

HAYDEN, Mrs. C. W. (Washington, D. C.). Wood engraving and 7 steel engravings. 23651.

HAYDEN, Miss FLORENTINE H. (See under Miss Anna L. Ward.)

HAYDEN, W. P. (Raymond, Me.). Eight specimens of vesuvianite and grossularite, and one specimen of grossularite. 24081.

HAYNES, Prof. H. W. (Boston, Mass.). Five quartz implements from New Hampshire, one from Massachusetts, and 14 paleolithic flint implements from Egypt. 23863. Deposit.

HEANY, W. H. (U. S. National Museum). Real, silver coin of Spain, date 1741, with the arms of Philip of Anjou. 23616.

HEARST, Mrs. GEORGE (Washington, D. C.). Harmonica, containing 24 musical glasses. 23411. Deposit.

HEATHCOTE, W. HENRY (Preston, Lancashire, England), through Mr. W. J. Farrer, of Orange, Va. Fifty-four species of land and fresh-water shells from Great Britain. 24355.

HEATON, A. G. (Washington, D. C.). Large picture, "The Promoters of the New Library Building." 23658. Loan.

HEIBERGER, T. J. (See under Frank D. Lewis.)

HEIDEMAN, O. (Department of Agriculture). Six specimens of *Neob rus petitii* Uhl. (23439); 41 specimens of Hemiptera, representing 19 species, some of which are new to the collection (23840).

HEIM, ALBERT. (See under Interior Department, U. S. Geological Survey.)

HEMPHILL, HENRY (San Diego, Cal.). Tertiary fossils from near Lake Whatcom, Wash., and 6 specimens of marine shells (23690); 3 specimens of *Ostrea veatchii* Gabb (23777).

HENNESEY, THOMAS F. (Cincinnati, Ohio). Ancient Greek and Roman coins. 24407. Deposit.

HENRY, Miss MARY (Washington, D. C.). Electro-magnetic engine for producing reciprocating motion by magnetic attraction and repulsion, invented and constructed by Prof. Joseph Henry in 1831;—one of the first applications of electricity for producing power. 24132. Deposit.

HENSHALL, Dr. J. A. (See under U. S. Fish Commission.)

HENSHAW, H. W. (Bureau of Ethnology, U. S.). Specimen of *Ophibolus rhombomaculatus* from Falls Church, Va. 23743.

HENSON, HARRY V. (Hakodate, Japan). A collection of birds' skins, consisting of 427 specimens (representing 181 species) from the Island of Yesso, Japan. Among this collection is a pair of the Great Japanese Eagle Owl (*Pseudoptyx blackistoni*). 24527. Purchase.

HERR, A. S. (Smithsonian Institution). Skin of Swamp-sparrow (*Melospiza georgiana*), from the District of Columbia. 23767.

HERR, STEPMAN (Smithsonian Institution). Reedbird (*Dolichonus oryzivorus*), in flesh, from Virginia. 23502.

HERRAN, Hon. THOMAS (Hamburg, Germany). Two pieces of ancient Indian pottery, found in a grave in the province of Antioquia, United States of Colombia (gift) (23438); 9 golden objects of ancient Colombian Indian workmanship, weighing 133 grammes, from the same locality (deposit) (23661).

HEWITT, G. C. (Rock Springs, Wy.). Specimen of elalerite and an unknown hydrocarbon from Wasatch Range, Utah (23797); ozokerite from Soldier Summit, Emery County, Utah (24108).

HIDDEN, WILLIAM E. (Newark, N. J.). Two specimens of monazite sand from North Carolina. 23805.

HILL, ROBERT T. (Austin, Tex.). Fossils representing the Lower Carboniferous fauna, consisting of *Productus semirecticulatus*, *Productus* sp., *Spirifera striata*, *Spirifera rocky-montana*, *Terebratula*, *Aviculopecten* sp., *Bellerophon* sp (?), from historical localities in Burnet County, Tex. The specimens from Shinbone Ridge represent the genera *Fenestella* and *Productus*. 23700.

HILLEBRAND, Dr. W. F. (U. S. Geological Survey). Yttrogummite from Arendal, Norway. 23457. (See under Interior Department, U. S. Geological Survey.)

HINDS, J. E. (See under The Hinds Ketcham Company.)

HITCHCOCK, Prof. C. H. (Hanover, N. H.). Coat, trousers, waistcoat, and moccasins of Chief Joseph of the Nez Percé Indians. 23990. Deposit.

HITCHCOCK, ROMYN (U. S. National Museum). Japanese playing cards. 23462.

HITCHCOCK, Miss ROSENA (Chicago, Ill.). Copy of the Allegany Republican, December 23, 1825, Anti-Masonic Almanac for the year 1832, and an almanac for the year 1841. 23455.

HOADLEY, Dr. F. H. (See under Dr. C. Hart Merriam.)

HOBBS, Prof. WILLIAM H. (Madison, Wis.). Rocks from various European localities (exchange) (23613); rocks from Wisconsin (gift) (23707). (See under University of Wisconsin.)

HODGE, Col. E. B. (Plymouth, N. H.). Hybrid trout, cross between Saibling and Brook Trout. 23672.

HODGE, E. R. (Army Medical Museum, Washington, D. C.). Set of United States stamped envelopes (2-cent issue of 1883). 23595.

HOFFMAN, Dr. W. J. (Bureau of Ethnology, U. S.). Model of Menomoni medicine man's grave with, symbols; crayon sketch of grave of Oshkosh and great lodges of the Menomoni. 23794.

HOLM, THEODOR (U. S. National Museum). Specimen of groroilite from the Kara Sea, 80 fathoms, (collected by the Danish North Pole Expedition of 1882 and 1883). 24289.

HOLMES, W. H. (See under Bureau of Ethnology, U. S.)

HOLTON, F. (Brookland, D. C.). Snake, *Ophibolus rhombomaculatus*. 23541.

HOOPER, WILLIAM (Superintendent of the Graphite mines, Ticonderoga, N. Y.). Graphite from the mines at Ticonderoga. 24062.

HOPKINS, C. L. (Umatilla, Fla.). Glass-snake (*Ophisaurus ventralis*). 24175.

HOPKINS, Master SAMUEL H. (Highland, Md.). A very beautiful specimen of American Sparrow Hawk (*Falco sparverius*). 24189.

HORNADAY, WILLIAM T. (Buffalo, N. Y.). Cowboy's saddle, used by Mr. Hornaday on his second buffalo hunt in Montana in the fall and winter of 1888. 24129.

HORNBLOWER, WILLIAM B., through J. Montgomery Wright, marshal, Supreme Court, United States. Programs relating to the centennial celebration of the Federal judiciary, February 4, 1890. 23363.

HOUGH, WALTER (U. S. National Museum). Lampwick trimmer about eighteen years old (23346); 14 plates, engravings of locomotive engines, published by John Weale, London, 1856 (23583); specimen of *Bostrychus cornutus* (imago, larva, and work), from Angola, Africa (23638); 7 specimens of fossil plants in clay, from Morgantown, W. Va., collected by Mr. Hough (23740).

HOWARD, L. O. (See under Elwyn Bates.)

HOWE, GEORGE H. (Evans, Colo.). Specimen of iron ore. 23499.

HUBBARD, GARDINER G. (West Washington, D. C.). Two books, catalogue of the works of Barye and a catalogue of the Secretan collection. 23692.

HUNTINGTON, J. H. (Silver City, N. Mex.). Building-stone from Albuquerque (23381): marble from Hanover Gulch, 15 miles east of Silver City (23600); 2 specimens of riccolite from Gila River, Grant County (23996); ornamental stone from Gila River (24107); rocks and ores (24234); building-stone and gold ore from South Dakota (24491).

HURTER, JULIUS (St. Louis, Mo.). Six snakes, 3 of which represent the species *Tropidoclonium lineatum* (23706); 4 Turtles (*Cistudo ornata* Agassiz, *Malaclemmys lesueuri*, *Chrysemys bellii*, and *Pseudemys elegans*) (23717); Turtle (*Trachemys troosti* Holbrook) from Hamburg Bay, Mississippi River (23755); snake and frog (24461).

HUTCHINSON, ARTHUR C. (Washington, D. C.). Parrot (*Amazona* sp.), in the flesh. 23847.

HYNDS, ALEXANDER (Danbridge, Tenn.). Small Confederate medal, made of silver(?), and an Indian marble(?) taken from the burial mound of a child. 24099.

IDDINGS, J. P. (U. S. Geological Survey). Volcanic bomb from the Island of Lipari, Mediterranean Sea (23803); basalt, with inclusion of vitrified sandstone, from Monte Gimmelaro (?) Ætna eruption of 1886 (24000).

INGRAM, EDWARD T. (Marshallton, Pa.). Sixty-one argillite implements from Chester County. 22026. Exchange.

INTERIOR DEPARTMENT.

OFFICE OF SECRETARY: Slocum, Hon. J. C. (surveyor-general, Tallahassee, Fla.), through Hon. John W. Noble, Secretary. Collection of old surveying instruments, consisting of a transit with telescopic tube, brass frame, wooden tripod, and detached legs; solar compass, tripod and leveling-head for the same, sextant and case, and standard chain, from the surveyor-general's office at Tallahassee. 23802.

U. S. GEOLOGICAL SURVEY, through Maj. J. W. Powell, Director. Two specimens of crinoids from the Trenton Limestone, Ottawa, Canada, *Periglyptocrinus billingsi* W. & Spr. and *Archæocrinus microbasalis* W. & Spr. (23361); crystal of hauerite from Mineo, Catania, Sicily (23702); specimen of rectorite from Arkansas, and a specimen each of molybdenite, scheelite and cuprodescloizite from Colorado (23795); 47 specimens of cretaceous fossils from Alabama, Mississippi, Texas, and Colorado (23898); 2 geological models (23911); 111 photographs, illustrating typical exposures of strata, contacts, folds, joints, etc. (24264); 12 specimens of minerals from New Mexico, consisting of agatized wood, silicified wood, garnet pebbles, and smoky quartz (collected by Mr. O. G. Dodge, U. S. Navy) (24364).

Collected by Dr. G. G. Becker: Four specimens of apophyllite and one of analcite from New Almaden, Cal., specimen of cinnabar in barite from Almaden, Spain, crystallized cinnabar from the Reddington Mine, Knoxville district, California, and a collection of specimens of quicksilver, made by Dr. Becker (24003).

Collected by Mr. Whitman Cross: Ten specimens of cerussite from Polonia Mine, Rosita, Colo. (23903).

Collected by Mr. Eakins: Two specimens of gadolinite from Devil's Head Mountain, Douglas County, Colo. (23448.) Deposit.

Collected by Dr. W. F. Hillebrand: Thirteen specimens of minerals from various localities in Colorado, 3 specimens of minerals from Glastonbury, Conn. (deposit) (23447); 45 specimens of brochantite and malachite from United Verde Mine, Jerome, Yavapai County, Ariz. (gift) (23630); 40 specimens of kyanite in quartz, 80 of dumortierite in quartz, and 74 of dumortierite and kyanite in quartz from Clip, Yuma County, Ariz. (gift) (23631).

Collected by Dr. W. P. Jenney: Three specimens of white pulverulent sulphide of zinc from Galena, Cherokee County, Kans. (gift) (23812); 3 specimens of barite pseudomorph after crinoid stems and shells from Sedalia, Mo., (24484).

Collected by Mr. F. H. Knowlton: Agatized wood from Chalcedony Park, Arizona, and a sample of smoky quartz from near Santa Fé., N. Mex. (23739).

INTERIOR DEPARTMENT—Continued.

Collected by Mr. E. A. Schneider: Ten specimens of minerals from Delaware County, Pa., 4 specimens of garnet, 4 of garnet in muscovite, and 2 of chalcedony (23677);

Collected by Mr. H. W. Turner: Garnet, epidote, and enargite from Alpine County, Cal. (23918).

Through Mr. C. D. Walcott: Slab of mud-marked limestone from Rathbone Brook, Herkimer County, N. Y. (24304); 2 slabs of slate showing bedding, cleavage, and faulting from Rensselaer County, N. Y. (24479); *Gyroceros* (?) sp. (?). Lower Carboniferous, Indiana, and 4 specimens of Devonian fish remains from Scotland (collected by Mr. Walcott) (24211).

Collected by Prof. L. F. Ward: Seventeen specimens of chalcedony from Fossil Point, Wyoming (23999).

Collected by Dr. George H. Williams: Chrome tourmaline from Montgomery County, Md. (23800).

IRBY, RICHARD. (See under Randolph-Macon College).

IRELAND, JOHN E. (Amityville, N. Y.). Mouse trap, found in a house supposed to be one hundred and fifty years old. 24186.

IRSCH, F. (New York City, N. Y.). Two specimens of Pita, showing the De la Roche process before and after treatment, samples of flax, jute, American hemp, and bow-string hemp. 23494.

IRWIN, CORYDON S. (Plain City, Ohio). Cecropia moth with cocoon. 23519.

IVES, FRED E. (Philadelphia, Pa.). Pamphlet entitled "Photography in the Colors of Nature." 24016.

JACK, W. H. (Natchitoches, La.) Specimens of silver sulphides. 23879. Exchange.

JACKSON, E. E. (Columbia, S. C.). Archæological objects, consisting of shallow stone hammers, rubbing-stone, grooved axes, polished hatchet, leaf-shaped implement (knife or spear-point), arrow and spear-points, stone pendant ornamented with lines and dots, fragments of pottery, and fragments of pot stone vessels. 24077.

JACKSON, ROBERT T. (Boston, Mass.). Collection of oysters, representing the early stages of their growth and illustrative of the donor's paper in Memoirs of the Society of Natural History on the Phylogeny of Pelecypods. 23731.

JACKSON, THOMAS H. (West Chester, Pa). Forty-four specimens, representing 3 sets, of eggs of *Callipepla squamata castanogastris* (Purchase). (23557); 5 eggs (one set) of *Melanerpes aurifrons* from Texas (gift). (23579).

JACOBI, O. F. (See under Henry F. Blount).

JAPANESE TRADING COMPANY (New York City, N. Y.). Japanese house (24525). Purchase.

JENKINS, Prof. O. P. (DePauw University, Greencastle, Ind.). Alcoholic specimens of fishes collected in the Bay of Guaymas, Sonora, Mexico, in July, 1887, by Profs. Jenkins and B. W. Evermann. 23988.

JENNEY, Dr. WALTER P. (U. S. Geological Survey). Native lead with minium and anglesite from Mineral Hill District, near Hailey, Alturus County, Idaho (gift) (23629); native white sulphide of zinc from Moll Mine, Galena, Kans. (gift) (23804); 154 specimens of minerals, consisting of eudialyte, manganopectolite, rutile, aegerite, monticellite, leucite and vesuvianite (purchase) (24299). (See under Interior Department, U. S. Geological Survey).

JEWELL, THOMAS. (See under Thomas J. Willis.)

JOHNS, H. W., MANUFACTURING COMPANY (New York City, N. Y.). Asbestus from Africa. 23713.

JOHNSON, R. M. (Timberville, Va.). Silver-lead ore. 24380.

JOHNSTON-LAVIS, H. J. (Naples, Italy). Eleven specimens of minerals from Greece, Italy, and Tyrol, consisting of smithsonite, azurite, augite, auricalcite, calcite, sulphur, bitumen, gehlenite, marialite, and small series of volcanic rocks from Vesuvius. 23409. Exchange.

JONES, JAMES T. (See under National Zoölogical Park).

JONES, Dr. L. C. (Sandwich, Mass). Albino Barn-swallow (*Chelidon erythrogastra*), 23594.

JORDAN, Dr. D. S. (See under U. S. Fish Commission).

JOUY, P. L. (U. S. National Museum). Three stone implements (surface finds) from Fusan, Corea (gift) (23703); 13 specimens of mother-of-pearl and four of jade from China (deposit) (23711); collection of Corean religious objects, books, pictures, art-work, and weapons, including a Japanese sword, 2 Canton cutlasses, and 43 photographs, (deposit) (23753) 2 shampooer's whistles, 2 clam-darts, and package of Corean tobacco (gift) (23754). (See under Dr. F. H. Goodwin, and U. S. National Museum).

JUNI, BENEDICT (U. S. National Museum). Calcite from New Ulm, Brown County, Minn. (23849); 12 specimens of plants (23945) of the Dakota Group.

KATZENBERGER & BROTHER (Greenville, Ohio).
Photograph of a collection of Indian relics. 23384.

KEEP, Prof. JOSIAH (Mills College, Cal.). Specimens of *Zonites conspectus* Bland, from Alameda County. 23838.

KELLER, CLYDE L. (Salem, Oregon). Three eggs (one set) of *Megascops asio saturatus* 24390.

KENDALL, W. C. (U. S. Fish Commission). Thirty birds' skins representing 26 species from near Port Royal, S. C. 24218.

KENNEDY, Hon. D. J. (See under Dr. D. J. Macgowan).

KEPPEL, F., & Co. (New York City, N. Y.). Silver-point drawing, "Head of Girl," by A. Legres. 23373. Purchase.

KERBY, Hon. J. O. (United States Consul, Para, Brazil), through Dr. Frank Baker. Two birds' skins from Brazil and a few feathers of the Eigretei, a rich and rare bird of the Heron species, found on the Island of Marajo, Amazon River; 11 specimens of the South American Golden Tortoise-beetle (*Desmonota variolosa* Web.) and 3 pieces of bark of the tree which the Amazon Indians use for paper. 24193.

KEVINSKI, J. B. (Lancaster, Pa.). Clavichord, brought to this country in 1741 by Henrietta Deckert. 24183.

KIMBERLEY DIAMOND MINES (South Africa), through Prof. E. J. Loomis. Rocks from the Kimberley Diamond Mines. 23603.

KIMMEL, WILLIAM A. (Washington D. C.). Zinc ore from Indian Territory. 24224.

KINCAID, T. (Olympia, Wash.). Twenty-seven species of coleoptera. 24509. (See under Nathan Banks.)

KING, Dr. G. (See under Royal Botanic Garden, Calcutta, India.)

KINGSLEY, J. S. (University of Nebraska, Lincoln, Nebr.). Manuscript on the decapods. 24420.

KINNEY, T. W. (Portsmouth, Ohio). Broken flint arrow-point retouched to serve as a scraper. 24205. Deposit.

KIRBY, G. W. (Brunswick, Ga.). Seven shells. 23858.

KIRBY & SMITH (Passaic, N. J.). Langshan fowl. 24302.

KIRSCH, P. H. (See under U. S. Fish Commission.)

KNAPP BROTHERS (Fabius, N. Y.). White Wyandotte fowl (23848); Wyandotte hen (24203).

KNOWLTON, F. H. (U. S. Geological Survey). Two samples of lignite from Potomac formation near Richmond, Va. (23357); spotted Turtle, (*Chelopus guttatus*) from Laurel, Md. (24395). (See under E. F. Hanley and Interior Department; U. S. Geological Survey.)

KNUDSEN, AUGUSTUS F. (Cambridge, Mass.). Two alcoholic specimens of mice, *Mus musculus* from Kauai, Hawaiian Islands. 24194.

KNUTSEN, T. (Deadwood, S. Dak.). Silurian limestone from the Deadwood and Delaware Smelting Company's Quarry (24133); silver ore from Silver Bullion Mine, Whitewood Mining District, Lawrence County (24182); 2 specimens of gold and silver ore from Maggie Mine, Ruby Basin, Lawrence County, and magnesium limestone (24400).

KOCH, J. B. (Bozeman, Mont.). Seventy rude implements, fragments of potstone vessel, knifes, arrow-points, flakes, and other archæological objects. 23697.

KOEBELE, A. (See under Department of Agriculture.)

KOEHLER, WALTER J. (Broken Hill, New South Wales), through Department of State. Collection of rare and valuable minerals from the Broken Hill Mines. 24503.

KOHN, GUSTAVE (New Orleans, La). Salamander (*Plethodon æneus*) from Lee County, Va. (23960); 8 specimens representing 4 species of snakes and salamanders, including *Tropidonotus clarkii* and *Manculus quadridigitatus* (24028); 2 alcoholic snakes representing 2 species (24090). Exchange.

KUERSCHNER, Prof. HUGO (Washington, D. C.). Belted King-fisher (*Ceryle alcyon*). 23401.

KUNZ, GEORGE F. (Hoboken, N. J.). Fragments of meteorite from Carroll County, Ky., Kiowa County, Kans., and Winnebago County, Iowa. 23395.

LACY, ROBERT T. (Camden, N. J.). Specimens of kaolin. 24524.

LAKE, B. B. (Bryson City, N. C.). Limonite after pyrite, 2 specimens of rutile, and 3 of zoisite, from Swain County, N. C. 23626.

LAMBERT BROTHERS (Kearney, Nebr.). White-faced Glossy Ibis (*Plegadis guarauna*) 24385. Purchase.

LAMBORN, Dr. ROBERT H. (New York City, N. Y.). Autographs, manuscripts, glass pitcher, wine glasses, silver cake-basket, knife and fork, and other relics of Gen. Washington (23995); anthropometric apparatus, chronograph, etc.* (24144).

LAMSON, D. S. (See under George H. Draper.)

LANDER, W. TERTSH (Williamston, S. C.). Coal plants from Tracy City, Tenn., Lower Coal-Measures. 24094.

LANGDALE, JOHN W. (Washington, D. C.). Ten specimens of Oriskany sandstone carrying fossils, from the District of Columbia (23907); menaccanite in quartz, garnet in granite, and actinolite from the District of Columbia (24148); rocks from the same locality (24222).

LANGLEY, Mr. S. P. (Secretary, Smithsonian Institution). Watches and 4 dials (23500); pack of Spanish "Monte" cards collected by the donor in Spain, and 2 reed pipes of Moorish character (24281). (See under S. G. Ward.)

LASPEVRES, Prof. H. (Bonn, Germany). Two specimens of polydymite from Schutzbach, Westphalia. 24168.

LEE, J. G. C., (Brevet Lieut. Col. U. S. Army, Vancouver Barracks, Washington.) Skull of mammal found on the North Fork of Rogue River in Oregon, near Medford. 24029.

LEE, W. G. (Washington, D. C.). Black-tail Turbit Pigeon. 23550.

LEIDY (estate of Dr. Joseph), (Philadelphia, Pa.). Gem collection of the late Dr. Leidy. 24398. Purchase.

LEMON, J. H. (New Albany, Ind.). Nest of Humming-birds from Jamacha Valley, California, and 4 birds' eggs from the same locality, 6 snail shells from Indiana, specimens of marine algæ and ferns from California, and Silurian and Devonian brachiopods. 24233. Exchange.

LEMMON, THEO. G. (San Carlos, Ariz.). Fragments of pottery and human bones from a mound near San Carlos. 24305.

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*These instruments belong to the series of apparatus devised by Francis Saltar.

LEWIS, FRANK D. (Special Agent, Indian Department), through Mr. T. J. Heiberger. Two ghost shirts from the late "Wounded Knee" Indian fight. 24204.

LEWIS, HARRY W. (Jefferson, Md.). Copper coin (one sen) and copper token (deux sous) of Lower Canada, 1837. 23832.

LEWISOHN BROTHERS (New York City, N. Y.), through Messrs. Phelps, Dodge & Co. Sample of African tin from the interior of Africa. 24202.

LINDSAY & EARLY (Carbondale, Pa.). Cylinder of the locomotive "Stourbridge Lion." 23694. Deposit.

LINSLEY, F. (Farmdale, Ohio). Three species of corals, consisting of *Monticulipora filiosa* (2 specimens), *Streptelasma corniculum* (2 specimens), and *Protarea vetusta* (specimen); 3 species of brachiopods, consisting of *Rhynchonella capax* (3 specimens), *Orthis biforata* (specimen), *Orthis retrorsa*, all from rocks of the Cincinnati Group (Hudson) Lower Silurian Age; iron pyrites. 23683.

LLOYD, WILLIAM. (See under Department of Agriculture, and Dr. C. Hart Merriam.)

LOCKWOOD, WILLIAM E. (Philadelphia, Pa.). Photograph of working model of locomotive in the possession of the Franklin Institute, Philadelphia. 23779.

LOOMIS, H. (Yokohama, Japan). Larvæ of *Ocneria dispar*, parasitized by *Apanteles* sp. 23417.

LOOMIS, Prof. E. J. (See under Kimberley Diamond Mines.)

LOPER, S. WARD (Assistant Geologist, U. S. Geological Survey, Middletown, Conn.). Specimen of folded gneiss (24340); triassic trap-rock from Baileyville, Conn. (24406).

LORING, Gen. CHARLES G. (See under Museum of Fine Arts, Boston, Mass.)

LÖSCH, A. (St. Petersburg, Russia), through Dr. E. A. Schneider, U. S. Geological Survey. Two specimens of xanthophyllite and a specimen of ripidolite from Nikolaje-Maximilianowsk Mine, near Slatoust, Siberia. 24261.

LOVETT, EDWARD (Croydon, England). Cup of glazed pottery, 2 fragments of vases, handle and portion of neck of stone flagon, 2 pieces of tile—one plain and the other ornamented, part of a brass spur and a brass keyhole escutcheon, found in making excavations in Old London; small bronze figure—forgery—made and sold about fifty years ago by men engaged in excavating, 8 pieces of Algerian pottery, lamp from Algeria, 2 Hindoo fans, water pipe, idol of white stone, 4 carved spoons from Ceylon, shell snuff box from France, snuff gourd, English tinder pistol, snuffers tray and snuffers, and a bundle of sulphur "spunks" from France (purchase) (23416); matchlock gun and Eskimo whalebone nooses (exchange) (23784); Moorish lamp from North Africa and 4 Hoschish pipes from the same locality, dagger from Tunis, brass Lota from Burmah, India, model of Swiss fire-drill, knife from an excavation made at Temple Bar, London, 11 pieces of pottery from Old London, bronze fish-hook from Swiss Lake dwellings, and a wooden dish, tapa mallet and cloth from the Fiji Islands, 10 pieces of pottery and a glass cover for vase, found while making excavations in Old London (exchange) (23950); set of Scotch war bagpipes made of ivory and silver, native dress from New Guinea, 3 specimens of plaited grass-work from the Congo River, 4 shell armlets from the Solomon Islands, 2 very old flint-lock pistols, Egyptian "writing" case made of brass, 4 pieces of pottery from Old London, and 2 time-measuring "King Alfred" candles (purchase) (24343).

LUCAS, H. D. (Black Creek, N. C.). Specimen of *Micropterus salmoides* with crustacean parasites (*Ternæocera*). 23477.

LUCAS, Dr. H. S. (Cullasaja, N. C.). Specimen of black spinel from Corundum Hill, N. C. 24248.

LUCAS, R. T. (Alexandria, Va.). Male albino opossum. 23789.

LUEDEKING, C. (Washington University, St. Louis, Mo.). Barite containing ammonia from near Sedalia, Mo. 24391.

LUTHE, F. H. (McGregor, Iowa). Seven specimens of corals, representing 5 species from the Hamilton Group (Devonian) of Iowa. 23388.

LÜTKEN, Prof. Dr. (See under Royal Zoölogical Museum, Copenhagen, Denmark.)

LUTTRELL, THOMAS J. (Washington, D. C.). Golden Eagle (*Aquila chrysaëtos*) from the Potomac River. 23791.

LYON, MARCUS W., Jr. (Rock Island, Ill.). Four eggs of *Agelaius phœniceus*. 23433.

LYONS, EVAN (Georgetown, D. C.). Albino Phœbe (*Sayornis phœbe*). 23781.

MCCORMICK, L. M. (See under Oberlin College, Oberlin, Ohio.)

MCCOUN, Mrs. H. J. (Oyster Bay, Long Island). Pair of Jersey-blue fowls. 23966.

MCDONALD, Rev. ALEXANDER (Prosperity, Pa.). Small oblong-shaped tablet of stalagmite polished marble, cut from the "Rock of Gibraltar." 24297.

MCDONALD, Col. MARSHALL. (See under U. S. Fish Commission.)

MACFARLANE, R. (Cumberland District, Saskatchewan, Canada). Sixty-two specimens, representing 40 species of birds' skins from Moose Lake and Cumberland House, 100 specimens of birds' eggs and 12 nests, skin and skeleton of *Mustela americana*, skin of *Arricola riparius*, a number of specimens of *Arvicola riparius*, *Hesperomys leucopus*, Shrew (probably *Sorex personatus*), and hides of Polar hare (*Lepus timidus*). 23685.

MCGINNIS, WILLIAM H. (Youngstown, Ohio). One hundred and fifty selenite crystals of various sizes, and 7 specimens of the same in the matrix, fossil nuts. 24329. Exchange.

MCGUIRE, J. S. Pyrite from the Isle of Elba. 23902.

MCINTOSH, LACHLAN H. (Washington, D. C.). Square pianoforte, made by Longman & Broadrip, London, England. 23866. Purchase.

MCMILLAN, D. T. (Magnolia, N. C.), through Mr. Frank Burns, U. S. Geological Survey. Fragments of a pottery vessel found in a marl bed near Magnolia. 24582.

MACE, JOSEPH (Smithsonian Institution). Yellowbreasted Chat (*Icteria virens*) in flesh. 24353.

MACOMBER, JAMES (Wrightsville, N. C.). Specimen of *Chrysemys reticularia*, one of the rarer species of Chelonians. 24262.

MACGOWAN, Dr. D. J. (Chinese Customs, Wenchow, China), through Hon. J. D. Kennedy, Consul-General, Shanghai, China. Alcoholic sturgeon, pair of stockings and 2 wooden folding pillows. 23456.

MAGNETIC IRON AND STEEL ORE COMPANY (Blacksburg, S. C.), through J. L. Black, managing director. Iron ore from the mines of the company. 24002.

MARGENHOFF, JOHANNES, through Mr. R. L. Garner, of Roanoke, Va. Cannon-ball found outside of Fort Sumter; pistol from Morris Island, Charleston Harbor, lost during the battle at Battery Wagenner. 24084.

MARRON, THOMAS (U. S. National Museum). Skin of Short-tailed Tern (*Hydrochelidon nigra surinamensis*) from the Potomac River. 23536. (See under William Bayley.)

MARSHALL, GEORGE (Laurel, Md.). Hooded Merganser (*Lyphodytes cucullatus*). 23367.

MARTIN, D. G. (Eagle Rock, Idaho). Infusorial earth. 24409.

MARTIN, Mrs. M. (Dr. Princess Viroqua) (Utica, N. Y.). Twenty-three photographs of the family and relatives (Mohawks) of the Princess Viroqua. 24145.

MASON, E. E. (Accotink, Va.). Adjustable pot-hook from the Custis Mansion, Woodlawn, Fairfax County, Va. 23861.

MASON, EDWARD P. (Boston, Mass.). Italian stringed instrument "Salterio" (Dulcimer) made about 1770, with ornamental outer case, and several sheets of manuscript music by Pasquale Anfossi, a celebrated and successful dramatic composer, 1733–'95. 23744.

MASON, Prof. O. T. (See under R. M. Bartleman, William J. Boyd, William J. Carter, H. Montgomery, and Ira H. Stout.)

MASSACHUSETTS SOCIETY FOR PROMOTION OF AGRICULTURE (Boston, Mass.), through Department of Agriculture. Two hundred and forty colored plates illustrating forest flora of the United States. 23588.

MATTHEWS, Dr. W., U. S. Army (Fort Wingate, N. M.). Wooden tongs used by the Navajo women for picking cactus fruit (23625); dyed wool of the Navajo sheep and dyestuffs used by the Navajo Indians of New Mexico and Arizona. (24191.)

MAXSON, C. C. (Westerley, R. I.). Three fresh specimens of Winninish (*Salmo salar*) of the land-locked form, from the Metabetchouan River, Quebec, Canada. 23510.

MAYER, J. (Twin Lakes, Minn.). Porcupine skin. 23459.

MAYNARD, Mrs. NELLIE LONG (Troy, N. Y.), through Mr. George W. Maynard. Breech-loading guns and guns fitted with the Maynard system of priming, inventions of Dr. George Maynard; square parts of Maynard rifle; wooden models of parts of guns; chargers; breech block; hammer and priming case; loading device; primed cartridges; cartridges and priming strips. 24523.

MEARNS, Dr. EDGAR A., U. S. Army (Fort Snelling, Minn.). Western Evening Grosbeck (*Coccotheraustes vespertinus montanus*), first plumage; new to the collection. 23790.

MEDER, FERDINAND (New York City, N. Y.). Six engravings (23668); set 7 of progressive proofs of a chromoxylograph, "Countess Voss," by F. W. Gubitz (24004); 8 blocks, including 1 block for lettering only, for a chromoxylograph "Portrait of Countess von Voss" engraved by F. W. Gubitz (24221). (Purchase.)

MEEK, Prof. S. E. (See under U. S. Fish Commission.)

MELLVILLE, Dr. W. H. (U. S. Geological Survey). Bismuthinite with chalcopyrite in quartz from Mariposa mine, Rosario District, Sinaloa, Mexico (24320); 2 specimens of napalite from Napa County, California; 2 of cinnabar from Morelos, Mexico; 5 of metastibnite, from Steamboat Springs, Nevada, and specimens of elaterite and livingstonite. 24493.

MENDENHALL, Dr. T. C. (See under Treasury Department, Coast and Geodetic Survey.)

MENGE J. F. (Meyers, Fla.). Three eggs (1 set) of *Megascops asio floridanus;* 6 eggs (1 set) of *Speotyto cunicularis floridana;* 4 eggs (1 set) of *Botaurus exilis*, and 4 eggs (1 set) of *Ardea tricolor ruficollis*. 24496.

MEREDITH, Hon. WILLIAM M. (See under Bureau of Engraving and Printing, Treasury Department.)

MERRIAM, Dr. C. HART (Department of Agriculture). Three eggs (1 set) of *Spizella breweri* (gift) (23378); specimens of *Exogyra arietina* from Painted Cave, Rio Grande bank, Tex.; 9 species of land and fresh-water shells from the same locality (collected by Mr. William Lloyd) (gift) (23554); 3 species of fresh-water gastropods from Salmon River, and a species of land-shells from Needle Peak, Idaho (gift) (23614); numerous fresh-water mollusks representing 4 species from Salmon River and Shoshone Falls, Idaho (gift) (23695); 2 specimens of fossil wood from Elm Creek, near New Eagle Pass, Tex. (gift) (23760); woman's suit, man's suit, boots, pantaloons, and sleeping-bag from the Eskimos of West Greenland, bead-work of the Piegan Indians of Montana, and pouches of the Montagnais Indians of Canada (collected by Dr. F. H. Hoadley) (deposit) (23828); 9 specimens of carboniferous limestone fossils, *Zaphrentis* sp., from Needle Peak, Idaho (gift) (23920); through Captain Charles E. Bendire, female parent, nest, and 3 eggs of *Dendroica cærula*, and egg of *Molothrus ater* (collected by W. E. C. Todd, near Beaver, Pa. (gift) (23954); skin of Indian Flamingo (*Phœnicopterus andersoni*), new to the collection (gift) (24126); Worm (*Aphrodita aculeata*), 4 specimens representing 2 species of ascidians, 2 specimens of shrimps, and dry shells, collected in and near the island of Grand Manan, New Brunswick, by Mr. S. F. Cheney (gift) (24165); Horned Toad (*Phrynosoma coronatum*) from Twin Oaks, San Diego County, Cal. (gift) (24388). (See under Department of Agriculture.)

MERRIAM, Hon. CLINTON L. (Locust Grove, N. Y.). Two pairs of Elk-antlers, interlocked, from Montana. 23827. Deposit.

MERRILL, GEORGE P. (U. S. National Museum). Columbite from Portland, Conn., and willemite from Franklin Furnace, N. J. 24242.

MERRILL, GEORGE R. (Grand Rapids, Mich.). Collection of Parker's and Weaver's Almanacs 1730–1750, inclusive, and an Indian skull. 23582. Exchange.

MERRILL, Dr. J. C., U. S. Army (Fort Reno, Ind. T.). Nest of *Vireo bellii* (23463); small collection of rodents, consisting of Grasshopper mice (*Onychomys* sp.), Meadow-mice (*Arvicola austerus*), Cotton rat (*Sigmodon hispidus*), and 3 bats, *Vespertilio* sp. (23729).

MERRILL, LOREN B. (Paris, Me.). One hundred and fifty specimens of apatite with quartz from Hebron, Me. (purchase) (23597); vein rock with garnets from Beckfield, Oxford County, Me. (exchange) (23773); granitic rock with garnets from the same locality (exchange) (23985).

MERRILL, L. H. (Orono, Me.). Mica diorite from Clifton, (23601); 3 photographs of beds of clay at Lewiston, Me., and photograph of a house of glacial drift builders at Auburn. (24185).

MERRILL, Mrs. N. H. (Washington, D. C.). Mocking bird (*Mimus polyglottus*) in the flesh, from Kansas. 23868.

MERRITT, W. ALLISON (Washington, D. C.). Two skins of Least Tern (*Sterna antillarum*) from Northumberland County, Md. 23529.

METCALFE, M. (Silver City, N. Mex.). Fork-tailed Lizard (*Cnemidophorus gularis*). 24519.

MILLS, ROBERT A. (Chuluota, Fla.). Shell adze from Persimmon Mound, on the Brevard side of St. John River. 23468.

MILLER, CHARLES. (See under Bureau of Ethnology.)

MILLER, CHARLES, Jr. (Grand Rapids, Mich.). Two fifty-dollar notes of Confederate scrip, three-dollar bank note of Michigan, and an old copper coin. 24287. Exchange.

MILLER, W. (Grand Rapids, Mich.). Part of a geode, found by Mr. Miller in Grand River, Michigan. 23350.

MITCHELL, C. E. (See under Cameron Silica Company, South Beddington, Me.)

MOCKABEE, LLOYD. (See under C. W. Warneke.)

MOHAWK, GOWANGO (Newark, N. J.). Two photographs of donor, "The Indian Mail Carrier." 23503.

MONSON MAINE SLATE COMPANY (Monson, Me.). Sawn and split slate. 24260.

MONTANDON, Prof. A. L. (Bucharest, Roumania). Fifteen named species of Old World hemiptera. 24097. Exchange.

MONTGOMERY, H. (Cortland, N. Y.), through Prof. O. T. Mason. Collection of mound relics from Dakota.* 23458. Deposit.

MONTGOMERY, HALE (Clinton, Mo.). Barn Owl (*Strix pratincola*). 24157.

MOONEY, JAMES (Bureau of Ethnology). Pair of Cherokee ball-sticks. 23764.

MOORE, LIEUT. W. I., U. S. Navy. (See under Prof. I. C. White.)

MOOREHEAD, WARREN K. (Xenia, Ohio). The Simonton collection of aboriginal relics from Warren County, Ohio. 23543. Deposit.

MORGAN, Gen. T. J. (See under Dr. Z. T. Daniel.)

MOSER, Lieut. J. F., U. S. Navy (Baltimore, Md.). Alcoholic specimens of fishes from Florida Reefs, consisting of *Chilomycterus, Ostracion, Pristis, Centropomus, Muræna, Balistes, Platyglossus, Hemirhombus, Urolophus, Centropristis, Monacanthus,* and *Echeneis*; alcoholic specimen of Corn-snake (*Coluber guttatus*), shells, and marine invertebrates. 23352.

MUELLER, Baron FERD. von (Royal Botanical Gardens, Melbourne, Victoria, Australia), through Mr. David White. Fossil fruits from Victoria, consisting of *Spondylostrobus Smythii, Pleioclinis Sheperdi* and *Conotheca turgida*. 23867.

* This collection has not yet been opened, and a full report on the collection will be published later.

MULLINS, Dr. WILLIAM H. (Rosiclare, Ill.). Galena (lead ore) from the Rosiclare Mines. 24237.

MURDOCK, W. P. (Spring Hill, Md.). Snowy Owl (*Nyctea nyctea*) in flesh, from Charles County, Md. 23878. Purchase.

MURPHY, A. C. (Shambow, Mont.). Stone from the so-called tin mine on the Sweetwater River. 24086.

MUSEO DE PRODUCTOS ARGENTINOS (Buenos Ayres), through Mr. John F. Thompson. One hundred and sixteen species of wood, from Argentine Republic. 24382.

MUSEO NACIONAL DE COSTA RICA (San José, Costa Rica), through Mr. George K. Cherrie. Sixty-five birds' skins representing 35 species from Costa Rica, including the types of 2 new species and 1 new genus, 2 species new to the collection, and plumages previously unrepresented (exchange) (24155); through Señor Anastasio Alfaro, director, skin of Rufous-spotted Whippoorwill (*Antrostomus rufomaculatus*), a new species from the Volcano Izarii, Costa Rica. (24376.)

MUSEUM OF FINE ARTS (Boston, Mass.), through Gen. Charles G. Loring. Spear from New Guinea. 23719.

MUSEUM OF NATURAL HISTORY (Paris, France), through Leon Vaillant. Alcoholic specimens of deep-sea fishes and dried skin of shark, collected by the *Travailleur* and *Talisman* expeditions and by the commission to Cape Horn, in the Atlantic Ocean, and Mediterranean Sea. 23345.

NATHORST, Prof. A. G. (See under Royal Swedish academy of Science, Stockholm, Sweden.)

NATIONAL MUSEUM, U. S. Collected by Mr. P. L. Jouy, alcoholic specimens of *Salvelinus fontinalis*, *Catostomus nigricans*, *Campostoma anomalum*, *Chrosomus*, *Notropis* (species), *Diplesium blennoides*, *Acantharchus*, from Richland Creek, North Carolina; 4 alcoholic specimens of snakes and 6 salamanders from Roan Mountain and other localities in western North Carolina; 12 alcoholic specimens of Crayfish (*Cambarus* sp.), 2 Woodchucks (*Arctomys monax*) 4 specimens of *Tamias striatus*, Shrewmouse (*Blarina brevicauda*), *Sciurus hudsonius*, Weasel (*Putorius vison*), and 2 specimens of *Sorex*, from Waynesboro and Roan Mountain, North Carolina; *Hesperomys* and *Tamias striatus* from Cranberry and Roan Mountain; 15 skins and alcoholic specimen of Carolina Snowbird (*Junco carolinensis*), 3 specimens of Winter Wren (*Troglodytes hiemalis*), Golden-crowned Kinglet (*Regulus satrapa*), and 10 specimens of birds from Waynesville; 3 specimens of magnetic iron ore from Cranberry Iron Mines, and 3 pieces of mica from a mine near Waynesville; collection of plants and insects, scraper, knives, arrow or spear-points, rude implement, leaf-shaped implement, polished hatchet, drilled object of potstone, arrow-point, and collection of land-snails (23445); 54 specimens of birds' skins, representing 33 species, from Tucson, Ariz. (23872); Snake, *Pituophis bellona* and a Frog, *Rana brachycepha* (23877); a small collection of Rodents and a Coyote skin from Tucson (23931); 30 specimens representing 17 species of birds' skins, 7 Lizards (series of *Uta stansburiana*), and small collection of mammals, from the vicinity of Tucson (23976); mammals from Tucson (24046); 19 birds' skins, representing 11 species, from Tucson (24085); specimens of worm-parasites of fish-eating birds from Guaymas, Mexico, transferred to Fish Commission (24137); 26 lizards and snakes, representing 10 species, from Guaymas, Sonora, Mexico (24178); 6 mammal skins, one Chipmunk, one Spermophile, and 4 Hares, from Arizona (24208); 2 Turtles (*Kinosternon*) from Arizona (24246); 89 alcoholic specimens of reptiles from Arizona (24270); alcoholic reptiles, chiefly lizards (24345); mammal and birds' skins and Turtle shell (24365); 7 alcoholic reptiles from Tucson (24396): 10 Turtles (*Kinosternon*) from Nogales, Ariz. (24472); 2 skins of Spermophile and 2 skins of Mice from Nogales (24480). Collected by Mr. George P. Merrill: rocks from Auburn, Me., and 4 samples of muscovite, showing secondary growth, from the same locality (23527).

NATIONAL ZOÖLOGICAL PARK (Washington, D. C.), Horned Grebe (*Colymbus auritus*) in the flesh, from Mount Vernon, Va., presented by Mr. James T. Jones, of Washington D. C., (24225); through Mr. W. C. Weedon, Barn Owl (*Strix pratincola*) hatched in one of the towers of the Smithsonian Institution (24451).

NAVY DEPARTMENT, U. S. BUREAU OF ORDNANCE, Commander William L. Folger, Chief of Bureau, Nickeliferous pyrrhotite from Sudbury, Ontario, Canada (23825).

NEFF, PETER (Cleveland, Ohio). Collection of objects illustrating the early history of photography. 24366.

NELSON, E. W. (Smithsonian Institution). Skin of Scott's Oriole (*Icterus parisorum, juv.*) from near Santa Fé, N. Mex. 23488.

NEUMANN, Dr. JULIUS (Custom House, Kiungchow, China). Collection of 20 Chinese musical instruments, 4 rain cloaks, and model of a water-wheel pump. (23679, 24256.) Purchase.

NEWCOMBE, Dr. CHARLES F. (Secretary of the Natural History Society of British Columbia, Victoria, British Columbia). Small collection of dried crustaceans from British Columbia, and alcoholic specimens of *Gebia pugettensis* with *Lepton* attached. 24419. Exchange.

NEWMAN, Bishop JOHN P. (Washington, D. C.). Mosaic dish inlaid with variegated stones from Agra, India. 23785.

NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY (Grand Central Station, New York City, N. Y.), through Mr. William Buchanan, superintendent. One of the wheels of the locomotive "De Witt Clinton." 24219.

NEW YORK ENGRAVING AND PRINTING COMPANY (New York City, N. Y.). Specimens illustrating the zinc etching (line), wash-out (line), and half-tone photomechanical processes. 24091. Purchase.

NEW YORK STATE MUSEUM (Albany, N. Y.), through Prof. J. C. Smock. Two cut stones of brown tourmaline from Newcomb, Essex County. 23605. Exchange.

NICHOLS, Capt. W. P. (Boston, Mass.), through Dr. John Bartlett, of Chicago. Model of a Burmese canoe. 23348.

NIMS, C. D. (Philadelphia, Pa.). Fluorite from Macob, St. Lawrence County, N. Y. 23959. Purchase.

NISSLEY, J. R. (Ada, Ohio). Twenty-four arrow and spear-points, 5 flint flakes, polished hatchet, mica, red paint, and a copper awl, numbering 33 specimens, from a mound in Putnam County, Ohio. 24255. Purchase.

NOAH, Judge J. J. (Washington, D. C.). Stalactite from Luray Cave, Virginia (gift). (23430.) Through Mr. John M. Noah, 2 broken porcelain plates brought from Tunis in 1818. Deposit. 23666.

NOAH, J. M. (U. S. National Museum). Essay on the "Lost Tribes of Israel," Vols. I, II and III. 23546. (See under Judge J. J. Noah.)

NOBLE, Hon. J. W. (See under Interior Department.)

NOËL, PAUL (Rouen, France). Fourteen species of European *Caribidæ*. 24278. Exchange.

NORTHERN PACIFIC RAILROAD (St. Paul, Minn.), through Department of Agriculture. Two half sections of Sitka spruce from a tree 2.311 millimeters in diameter. 23586.

NORTHROP, JOHN I (New York City, N. Y.). Seven specimens of starfishes and ophiurans from the Bahama Islands, consisting of *Linckia guildingii* Gr., *Linckia guildingii* (?), *Echinaster lentus* (?), *Ophiurans appressa* Say, *Ophiocoma echinata*, *Ophiocoma pumila*, and *Ophiothrix* sp. 23782.

NORTON, Dr. C. A. (Washington, D. C.). Warming-pan formerly belonging to the Franklin family, photograph of fire-place in the Franklin homestead, Nantucket, Mass., and photograph of the Whittier fire-place, Haverhill, Mass (23641); fire-tongs from Denmark, brought over by the Muller family in 1792, used to transport coals of fire from one house to another in olden times (23798).

NORTON, FRED. A. (Washington, D. C.). Wooden club from Easter Island. 23783. Deposit.

NYE, WILLARD, jr. (New Bedford, Mass.). Twenty-seven stone implements from an old corn field about 5 miles east of Seaconnett River, Rhode Island, and 19 stone implements found 1 mile east of the mouth of Wood's Holl. 23869.

OBERLIN COLLEGE (Oberlin, Ohio), through L. M. McCormick. Alcoholic specimens of reptiles from Africa and various localities. 23632.

OLDT, R. B., (Riverton Mich.). Clover leaves. 24404.

O'NEILL, WILLIAM O. (Prescott, Ariz.). Six specimens of onyx from a quarry near Prescott, collected by Mr. O'Neill and transmitted to the National Museum through the courtesy of the Quartermaster's Department, U. S. Army. 24504.

ORCUTT, C. R. (San Diego, Cal.). Alcoholic specimens of reptiles, mammals, *Promops*, *Thomomys*, *Arricola*, *Ochetodon*, and Black-headed Gull (23575); specimen of epidote from Lower California (23698); 2 specimens of *Hesperomys* sp., representing a species allied to *Hesperomys anthonyi*, but not identical with it, specimens of *Perognathus penicillatus*, *Dipodomys* sp., *Molossus californicus*, *Vespertilio nitidus*, alcoholic specimens of *Chordeiles acutipennis texensis*, alcoholic specimens of fishes, comprising *Apocope carringtoni*, *Cyprinodon californiense*, *Gillichthys y-cauda* juv., *Cremnobates integripinnis*, insects, alcoholic specimens of marine invertebrates, consisting of worms, sponges, tunicates, crustaceans and echinoderms, 2 specimens of *Echinarachnius excentricus* Val., specimen of *Strongylocentrotus purpuratus* A. Ag., mollusks, consisting of two slugs, the larger one *Ariolimax californicus*, and a smaller one probably *Ariolimax niger* (23724); 7 species of coleoptera from San Diego Mountains, 2 alcoholic specimens of *Mugil mexicana* from Lower California, crabs, shrimps, isopods, and sponges from San Diego, reptiles and mammals (24014); lizards and mammals (24021); collection of alcoholic insects, mostly coleoptera, including 80 specimens of *Asida hirsuta* from the Colorado desert, San Diego, Cal., (24055.) (See under George W. Derbrow.)

ORE, W. J. (Mossy Creek, Tenn.). Living specimen of rare Longicorn Beetle (*Dryobius sexfasciatus* Say). 24502.

ORTON, Prof. EDWARD (Columbus, Ohio). Three specimens of *Sporangites Huronensis*, 2 specimens of *Dadoxylon Newberreyi*, and 2 of *Dadoxylon* sp., from the Devonian and Carboniferous formation of Ohio. 23983.

OSBORN, Prof. HERBERT (Ames, Iowa). Four rare species of North American coleoptera, consisting of *Saprinus rotundatus*, *Leptura americana*, *Stephanocleonus plumbeus*, and a new species, *Barini*. 23347.

OSBORNE, J. W. (Washington, D. C.). Collection of specimens illustrating technically the process of photolithography invented by the donor (23738); 2 photographs of Australians and 17 lithographs, by the Osborne process, representing social life in China (23775); a copy of Eder's "Ueber die Reactionen der Chromsäure, etc.," Vienna, 1878 (24034); documents relating to photomechanical processes, and 4 specimens of photomechanical process work (24361).

OXFORD MUSEUM (Oxford, England), through Mr. Henry Balfour. Bamboo blowpipe from India. 24291. Exchange.

PALACE HOTEL (Cincinnati, Ohio). Portion of flesh from "Chief," the elephant shot at the Cincinnati "Zoo" December 10, 1890, and served for dinner December 17, at the Palace Hotel, Cincinnati. 23882.

PALM, CHARLES (New York City, N. Y.). Ninety specimens, representing 41 species, of North American coleoptera. 23853. Exchange.

PALMER, JOSEPH (U. S. National Museum). Specimens of *Perna maxillatus* Lam. and *Perna rorta* Say, from the Potomac River (23511); skeleton of domestic pig (24173).

PALMER, WILLIAM (U. S. National Museum). Red Squirrel (*Sciurus hudsonius*) from Ballston, Va. 24369. (See under Elliott-Palmer Expedition).

PALMER, W. L. (Crookston, Minn.). Skull of moose. 24384.

PARKE, DAVIS & CO. (Detroit, Mich.). Thirty-six specimens of indigenous drugs (23957); miscellaneous drugs (24040).

PATTERSON, H. J. (College Park, Md.). Marl from the farm of Mr. Thomas R. Brooks, Seat Pleasant, Prince George County, Md. 24235.

PATTON, C. H. (Washington, D. C.). Egg-case of whelk. 24031.

PAYN, ELIAS J. (Tres Piedras, N. Mex.). Sample of red and gray granite. 24456.

PAYNE, R. F. (See under Dr. Cheves Bevill).

PEALE, Dr. A. C. (U. S. Geological Survey). "Diamond Polish" (volcanic dust) from the Diamond Emery Company, Phillipsburg, Kans. 23924.

PECK, C. H. (Newtown, Conn.). Two brass buttons about one hundred years old, and castings of 16 buttons of the style used during Revolutionary times. 23762.

PECK, W. B. (Sharpsburg, Ky.). One 16mo volume, entitled "The American Schoolmaster's Assistant," etc., Lexington, 1811, 23643.

PEIRCE, Dr. A. C. (Drownville, R. I.). Two skins of Kangaroo-rat (*Dipodops compactus* True.). 24286. Purchase.

PENFIELD, Prof. S. L. (Yale College, Conn.). Fourteen specimens of minerals from Nova Scotia, and 1 specimen from Pennsylvania. 23799.

PENNOCK, C. J. (Kennett Square, Pa.). Four eggs (1 set) of *Chætura pelagica* and 2 nests of the same variety. 23523.

PENNYPACKER, C. H. (West Chester, Pa.). Seven specimens of minerals. 24441. Purchase.

PERKINS, FREDE RICK S. (Madison, Wis.). Large collection of prehistoric copper and galena objects.* 23617. Purchase.

PERRY, TROUP D. (Savannah, Ga.). Nest and 3 eggs (1 set) of White-eyed Vireo, nest and 2 eggs (1 set) of Summer Tanager, nest and 4 eggs (1 set) of Painted Bunting, and nest and 4 eggs (1 set) of Yellow-breasted Chat. 23365.

PETERS, Rev. JOHN P. (West Philadelphia, Pa.). Kufa, plow, spade, 2 guns, handle of pestle, 2 paddles for Kufa from Bagdad, strike-a-light, necklace of silver, bracelets, silk bag, nose-ring, paint for eyelashes, pistols, holsters, coffeepots, clubs, garments, mill, sword, and other objects obtained by Mr. Peters for the National Museum from the Arabs of Mesopotamia. (23986, 24087.)

PHELPS, DODGE & CO. (See under Lewisohn Brothers.)

PHILLIPS, HALLETT W. (Washington, D. C.). Book: "Shut your mouth," by George Catlin. 23811.

PHINNEY, ELIAS (Cooperstown, N. Y.). Alcoholic specimen of Otsego Lake Whitefish (*Coregonus clupeiformis* var.). 23971.

PHOTOGRAVURE COMPANY (New York City, N. Y.). Collection of proofs. 23810. Purchase.

PICKETT, Dr. J. M. (Greensboro, Ala.), through Dr. William C. Avery. Two eggs (1 set) of *Catharista atrata*. 24506.

PIEDRA, MIGUEL (Lagos, Mexico). Four specimens of opal from Queretaro, Mexico. 23874.

PILLARS, JAMES (Lima, Ohio). Twenty card-photographs representing archæological specimens, the originals of which were found chiefly in Allen County, Ohio. 24103. Exchange.

PILSBRY, H. A. (Philadelphia, Pa.). Specimens of *Bulimulus ragsdalei* Pils., and *Monodonta crusoanus* Pils. 23664.

PLEAS, C. E. (Clinton, Ark.). Specimens of dried flowers, consisting of *Amelanchier canadensis*, *Delphinum azureum*, *Asclepias tuberosa*, *Rhododendron viscosum*, *Trifolium reflexum*, *Chrysanthemum leucanthemum*, and *Asclepias variegata*. 23356.

POESCHE, VICTOR (Washington, D. C.). Archangel Pigeon. 24300.

POND, Lieut. CHARLES (Navy Department). Specimens of Grasshoppers, *Dictyophorus* sp. from near Palin, and Firefly, *Photuris* sp., from San José, Guatemala. 23687.

* This collection was purchased for the National Museum from Mr. Perkins by a special appropriation of Congress.

PORTER, FRED. W. (Chicago, Ill.). Collection of old State bank notes (21 notes from $1 to $20, 1817 to 1860). 24152.

POSEY, Miss KATE (U. S. National Museum). Yellow-billed Cuckoo (*Coccyzus americanus*). 24512.

POTTER, Rev. J. T. (Chaplain, U. S. Army, Fort Clark, Tex.). Skin of Massena Quail (*Cyrtomyx montezumæ*). 23910.

POTTER, OSCAR (Scott, N. Y.). Orthoceras from the Upper Devonian formation. 23609.

POWELL, Maj. J. W. (See under Bureau of Ethnology, and Interior Department; U. S. Geological Survey.)

POWERS & WEIGHTMAN (Philadelphia, Pa.). Miscellaneous medicinal preparations. 23389.

PRENTISS, E. C. (Washington, D. C.). Specimen of quartz from Little Falls, Herkimer County, N. Y. (Returned.) 24220.

PRILL, Dr. A. G. (Sweet Home, Oregon). Two skins, male and female, of Ring-necked Pheasant (*Phasianus torquatus*) from Oregon (24253); 11 eggs (1 set) of Ring-necked Pheasant (*Phasianus torquatus*), a species introduced into the United States, and a new and interesting addition to the collection (24433); nest and 4 eggs of *Dendroica nigrescens*, nest and 4 eggs of *Turdus ustulatus*, and nest and 3 eggs of *Cinclus mexicanus* (24498).

PURCELL, N. J. (Hillsboro, Va.). Copperhead-snake (gift) (23509); collection of ethnographical objects from the Hupa and other Indians at Round Valley, Cal. (purchase). (23553.)

PUTNAM, Prof. F. W. (Peabody Museum, Cambridge, Mass.). Ancient iron fire-place lamp, found in the remains of a fruit-drying house, built on a mound in Adams County, Ohio. 23645.

RAGAN, JOSEPH (Washington, D. C.). Two fresh specimens of *Seriola stearnsi* juv., from Cape Charles, Va. 23476.

RAGSDALE, G. H. (Gainesville, Tex.). Two eggs of Western Night Hawk from Denton County. 23434.

RALPH, Dr. W. L. (Utica, N. Y.). Fifty-one specimens, representing 8 species, of rare and valuable birds' eggs, mostly from Florida, 3 of the species new to the collection. These specimens consist of 2 eggs (1 set) of Swallow-tailed Kite (*Elanoides forficatus*) egg of Red-tailed Hawk (*Buteo borealis*), 12 eggs (6 sets) of Florida Red-shouldered Hawk (*Buteo lineatus alleni*), 9 eggs (5 sets) of Florida Barred Owl (*Syrnium nebulosum alleni*) (new to collection), 2 eggs (1 set) of Florida Screech Owl (*Megascops asio floridanus*), 10 eggs (2 sets) of Florida Crow (*Corrus americanus floridanus*), 3 eggs (1 set) of Southern Hairy Woodpecker (*Dryobates villosus audubonii*) (new to the collection), and 12 eggs (3 sets) of Wilson's Phalarope (*Phalaropus tricolor*) (24166, 24333); skin of Southern Hairy Woodpecker (*Dryobates villosus audubonii*), from San Mateo (24341); through Capt. Charles E. Bendire, remains of an old Indian necklace from mound-builders' tomb, with stone implement from the same locality, and a handsome spear-point (24349); nest and 3 eggs of *Sporophila morelleti sharpi*, 8 eggs of *Parus atricristatus* (new to the collection), 2 eggs of *Chordeiles texensis*, 4 eggs of *Tryannus melancholicus couchii* (new to the collection), 2 eggs of *Columba flavirostris* (24516).

RAMBO, M. ELMER (Lower Providence, Pa.). Six eggs and 2 birds' nests, branch of the Eucaliptus tree from Australia, and 2 species of pressed sea moss from the Pacific Ocean. 24436.

RANDALL, C. E. (Catawissa, Pa.). Portions of vertebra of Rattlesnake. 23472.

RANDOLPH-MACON COLLEGE (Ashland, Va.), through Richard Irby, Secretary and Treasurer. Medal commemorating the incorporation of the college, February 3, 1830. 24124.

READ, CHARLES H. (See under British Museum, London, England.)

READY, A. P. (See under British Museum, London, England.)

REED, Capt. A. V., U. S. Navy (Navy Department). Dragon-fly (*Cordulegaster*) from Brazil (?) and Turtle, *Testudo tabulata*. 23355.

REDWOOD, F. T. (Baltimore, Md.). Pair of Japanese swords and an ancient Peruvian wooden image (23611); Hara-kiri dirk from Japan (23716). (Exchange.)

REYNOLDS, H. L. (See under Bureau of Ethnology.)

RHEES, WILLIAM J. (Smithsonian Institution). Daguerreotypes of William T. Johnson, governor of Pennsylvania, 1851, and Maj. Gen. Hugh Brady, U. S. Army, 1768–1851, and an ambrotype of Dr. John D. Easter, chemist of the Smithsonian Institution in 1855 (24001); thoroughbred Jersey calf (24025).

RICH, A. F., & Co. (Boston, Mass.). Specimen of Four-bearded Rockling (*Onos cimbrius*), from Placentia Bay, Newfoundland. 23952.

RICHMOND, CHARLES (Washington, D. C.). Box Turtle (*Cistudo carolina*). 23343.

RICHMOND, CHARLES W. (Department of Agriculture). Forty-three birds' skins, representing 24 species, from Chapada, Province Matto-Grosso, Brazil (exchange) (23382); two specimens of *Pteroglossus castanotis* and *Colaptes campestris* (exchange) (23517); series of shells and sterna of birds (24024); Slate-colored Junco (*Junco hyemalis*), from Washington, D. C. (24386); Tree Frog (*Hyia versicolor*) from Glen Echo, remarkable for its unusual color (24460).

RICE, Prof. WILLIAM NORTH (Middletown, Conn.). Specimen of cobalt and nickel ore (smaltite). 24023. Exchange.

RICE, Hon. WILLIAM T. (United States Consul, Leghorn, Italy). Six historical medals, consisting of bronze medal, 1779, Rhode Island fight; silver medal, 1780, armed neutrality of Russia, Denmark, Sweden, and Holland during the war of independence of America, with the arms of the four States "Ichova wreeker der verbonden;" silver medal in duplicate of the above, silver medal, 1784, presented by the society "Voorveÿheid en ÿver" to the State of Frisland, Holland, (Friseland arms) on the occasion of John Adams's reception as ambassador of the United States; silver medal, The Independence of the United States recognized by Holland, "Libera Soror," April 19, 1782; and a silver medal, Treaty of Commerce between the United States and Holland, October 7, 1782.

RICHARDS, Mr. and Mrs. (See under F. D. Foster.) (23862.) Purchase.

RIDGWAY, AUDUBON. Bat, *Nycticejus crepuscularis*, from Sugar Creek Prairie, Richland County, Ill. (23420); Snake, *Ophibolus rhombomaculatus*. (24241.)

RIDGWAY, ROBERT (National Museum). One hundred birds' skins, representing 55 species, chiefly from Richland County, Ill. (23369). Red-tailed Hawk (*Buteo borealis*) in flesh, from Maryland (23875); Salamander (*Plethodon cinnereus*), from Brookland, D. C. (24027); 44 specimens, representing 29 species of birds' skins, chiefly from Laurel, Md. (24156); Box Turtle (*Cistudo carolina*), from Brookland, D. C. (24374).

RILEY, Prof. C. V. (Department of Agriculture). Seventy-one species of North American Coleoptera, some new to the collection, collected by Prof. L. Bruner (24250); 1,100 specimens, representing about 240 species, of North American Microlepidotera (24279), land-shells from Blanco County, Tex. (24347); series of Lepidoptera, consisting of 17 specimens, representing 17 species, and 200 specimens, representing 20 species, of Coleoptera, most of which are rare and valuable to the collection, obtained by Mr. D. W. Colquillet in San Diego County, Cal. (24459), (See under Department of Agriculture.)

RIXFORD, GEORGE P. (San Francisco, Cal.). Two polished slabs of Inyo County marble. 24378.

ROBINSON, JAMES H. (Lewiston, Idaho). Sandstone composed almost wholly of finely comminuted pumice. 24426.

ROCK, Prof. MILES (Washington, D. C.). Two specimens of Silky Ant-eater (*Cyclopturus didactylus*) from Guatemala (24311, 24371).

ROCKENSTYRE, C. E. (Albany, N. Y.). Silver Sebright Bantam fowl, Golden Sebright Bantam fowl, Buff Cochin Bantam fowl, and Bearded Polish fowl (24317, 24508).

ROCKHILL, W. W. (Washington, D. C.). Pair of Corean childrens' shoes, and Corean quiver with arrows (gift) (23359); collection of Chinese cloisonées, enamels, lacquers, and bronzes, Chinese and Japanese swords and daggers, belt-knives with chopsticks, Moorish daggers and short swords, Catalonian knife, Corean belt-knife and baton (deposit) (23372), Chinese Buddhist book, Thibetan gospels (gift) (23498); pair of Algerian spurs, and Chinese tobacco-pouch (gift) (23592); map of Pekin illustrating popular Chinese cartography (24520).

ROEBLING, Col. W. A. (Trenton, N. J.). Willemite from Franklin, N. J. 24437.

ROESSLER, A. R. (Laredo, Tex.). Two specimens of selenite from the Rio Grande Valley (23391); hematite axe and arrow-point found while digging an artesian well near Laredo, Tex. (23414).

ROGAN, JAMES W. (Amis, Tenn.). Piece of reddish brown hematite plowed up in a field, probably an Indian paint-stone; a square block of *Scolithus* or annelid borings, from near Bradshaw's Springs, Clinch Mountain, and 3 specimens of siliceous sandstone colored by iron oxide. 23696.

ROGERS, Col. GEORGE T. (Lynnhaven, Va.). Military coat of a colonel in the Virginia Infantry, Confederate States Army. 23650.

ROGERS, THOMAS (Manchester, England). Specimens of *Planorbis dilatus* from a canal at Manchester. 24019.

ROMEYN, Capt. Henry, U. S. Army, (Fort Ringgold, Tex.). Five fossil oysters and a piece of petrified wood found in the bed of the Rio Dolores. 25110. (See under Lieut. W. W. Wotherspoon.)

ROPES, J. (Ishpeming, Mich.), through S. S. Ropes. Gold and silver ores from Marquette County, Mich. 24521.

ROPES, S. S. (See under J. Ropes.)

ROTHERMEL, Dr. A. W. S. (Ida Grove, Iowa). Iron ore (limonite) from near Mazarn, Ark. 24011.

ROWE, E. S. (Washington, D. C.). Strawberry Finch (*Sporoginthus amandava*). 24153.

ROYAL BOTANIC GARDEN (Calcutta, India), through Dr. G. King, superintendent. Collection of dried plants from India. 23857. Gift.

ROYAL BOTANICAL GARDENS (Kew, England). Textile fabrics and other articles, 13 miscellaneous drugs, and a mat from New Guinea (23358); through Dr. W. T. Thiselton-Dyer, director, collection of Indian fabrics (23807); seeds, transferred to United States Botanic Garden. 24435. Exchange.

ROYAL GEOGRAPHICAL SOCIETY (London, England), through Mr. H. W. Bates, Assistant Secretary. Bronze medal commemorating Stanley's expedition for the relief of Emin Pasha. 24065.

ROYAL MUSEUM OF NATURAL HISTORY (Berlin, Germany). Collection of echinoderms from Europe, South America, Asia, and East Indies. 24474. Exchange.

ROYAL SAXON MINING ACADEMY (Frieberg, Saxony). Fifty-five specimens of barite, pyrite, calcite, dolomite, native silver, chalcopyrite, galena, bornite, argentite, fluorite, marcasite, siderite, uraninite, tennantite, sphalerite, native arsenic, parargyrite, xanthoconite, annabergite, proustite, and berthierite. 23830. Exchange.

ROYAL SWEDISH ACADEMY OF SCIENCE (Stockholm, Sweden), through Prof. A. G. Nathorst. Collection of Arctic mosses. 23720. Exchange.

ROYAL ZOÖLOGICAL MUSEUM (Copenhagen, Denmark), through Prof. Dr. Chr. Lütken, president. Twenty-seven specimens representing 11 species of marine shells, 4 species of fishes consisting of *Liparis fabricii*, *Lycodes lütkeni*, *Icelus hamatus*, *Aspidophoroides olrikii*, collection of crustaceans numbering 85 specimens, including echinoderms, bryozoans, hydroids, worms, sponges, anthozoa, and ascidians collected by the steamer *Dymphna* during an exploring expedition in 1882-'83, in the Arctic regions, Kara Sea, and on the southern coast of Nova Zembla. 24114.

RUBY, CHARLES (Fort Randall, S. Dak.). Four specimens representing 3 species of birds' skins consisting of *Porzana carolina*, *Coccyzus erythropthalmus*, and *Setophaga ruticilla* (23410); fossil bones of reptiles and fishes (23512.)

RUDDY, THOMAS (Palé, Cowen, Wales). Two hundred and thirty-two specimens, including 44 genera and 80 species of Cambrian fossils. 24325.

RUSS, A. B. (Washington, D. C.). Five specimens of native gold in quartz from Montgomery County, Md. 23939.

RUSSELL, Prof. I. C. (U. S. Geological Survey). Three specimens of coal from Alaska and Vancouver Island, leather pouch from Yakutat containing a stone dish used as a charm by medicine man; 2 stone mortars ornamented with rude carvings, used for grinding tobacco, and also as a lamp; a stone adze and a rude painted stone implement of unknown use from Yakutat (23735); iron ore from Michigan and specimens of coal from Alabama (23936); 2 faulted pebbles from Pinnacle Pass, Mount St. Elias, Alaska. (24328.)

RUST, HALBERT (Jeffersonville, Ind.). Collection of human bones and specimens of material surrounding them, consisting of 63 specimens taken from an Indian burial-place near Clarksville, Clarke County, Ind. 24322.

SAGE, JOHN H. (Portland, Conn.). Fossil plant, *Dendrophycus triassicus* Newby. 23759.

SAINT, G. A. (Pittsburg, Pa.). Nineteen arrow-points. 24414.

SAN JOAQUIN VALLEY COAL MINING COMPANY (Hanford, Cal.). Sample of coal. 24448.

SAVAGE, M. F. (New York City, N. Y.). Two fat lamps, Kyal lamp, and water-heater for shaving purposes, from Massachusetts, and night-lamp from Providence, R. I. 23640. Exchange.

SCHENCK, C. D. (Washington, D. C.). Three pit game-fowls (23376); blue red-muffed pit game-fowl (23915).

SCHWEYER & LIESS (King of Prussia, Pa.). Two polished slabs of blue marble. 24083.

SCHMID, EDWARD S. (Washington, D. C.). Mynah (*Gracula*, species) in the flesh (23576); Parrakeet (*Bolborhynchus*, species) from South America (23362); 3 birds in the flesh (23366); Grass Parrakeet (*Melopsittacus undulatus*) in the flesh (23501); Jacarini Finch (*Volatinia jacarina*) in the flesh (23504); African Parrot (*Psittacus erithracus*), and Mountain Dove (*Geopelia striata*) from Mauritius, Indian Ocean (23686); Troupial (*Icterus icterus*) in the flesh (23792); Parrakeet (*Conurus*, species) in the flesh (23816); domestic pigeon of the Nun variety (24005); Cockatoo Parrakeet (*Nymphicus norœhollandiœ*) in the flesh (24022); Albino Java Sparrow (*Padda oryzivora*) in the flesh (24118); Finch (*Munia*, species) in the flesh (24239); hybrid Canary and Goldfinch (*Serinus canariensis* x *Carduelis carduelis*) in the flesh (24393).

SCHENCK, J. (Mount Carmel, Ill.). Specimen of Hawk. 23896.

SCHNEIDER, Dr. E. A. (U. S. Geological Survey). Specimen of leuchtenbergite from Schischimsk Mine, near Slatoust, Southern Ural, Russia. 23627. (See under U. S. Geological Survey and A. Lösch.)

SCHREIBER, J. D. (Allentown, Pa.). Earthy forms of the mineral graphite or plumbago, and rock carrying the same mineral in scales. 24425.

SCHWARZ, E. A. (Department of Agriculture). Two species of *bittacus*, new to the collection, from Fort Pendleton, Md. 23475.

SCOLLICK, J. W. (U. S. National Museum). Six chickens, 2 Black Minorcas and Sumatra Game fowl. (23375, 23397, 23571.)

SCOTT, W. E. D. (New York city, N. Y.). Two eggs (1 set) of *Haliœtus leucocephalus*, and 2 eggs of *Ardea occidentalis* from Florida (23578); 105 birds' skins representing 27 species from Punta Rassa and Tarpan Springs, Fla., and 4 specimens representing 2 species of birds' skins from Dry Tortugas (23642).

SCUDDER, S. H. (Cambridge, Mass.). Type specimens of fossil insect masses, *Corydalites fecundus*, from Colorado, collected by the U. S. Geological and Geographical Survey of the Territories. 24274.

SEAL, Mr. (Cape Town, South Africa), through Prof. Cleveland Abbe. Specimen of crocidolite from Griqua Town, Griqualand, South Africa. 23922.

SEAL, WILLIAM P. (See under B. A. Bean, U. S. Fish Commission, and Dr. Hugh M. Smith.)

SEAY, WILLIAM W. (Rome, Ga.). Specimen of tetradymite with native gold in quartz from near Rockmart, Paulding County, Ga. 24367.

SECOR, DAVID PELL (Curator and Librarian of the Bridgeport Scientific Society, Bridgeport, Conn.). Twelve arrow-points of white quartz from various localities along the southwestern coast of Connecticut, from Bridgeport to Stamford. 23757.

SECREST, T. D. (Okolona, Ark.). Fossil bones of mammals. 24275. Deposit.

SEELY, Col. F. A. U. S. Patent Office). Twenty-seven photographs of ethnological objects from Spain (purchase) (23709); set of bronze weights and a brass clock from Madrid (gift). 24078.

SEELY, Mrs. F. A. (Washington, D. C.). Silver coffee-urn presented to Capt. Moses Rogers, steamship *Savannah*, at Stockholm in 1819 by Sir Thomas Graham, and a gold medallion with Russian miniature on ivory of Capt. Rogers. 24431.

SHARP, C. A. (Lockport, N. Y.). Golden Wyandotte fowl, in the flesh. 24228.

SHARP, C. A., & Co. (Lockport, N. Y.). Indian game-fowls and chickens (24075, 24158, 24172, 24257).

SHARP, Capt. THOMAS, U. S. Army (Fort Russell, Wyo.). Two epiphyses from the cervical vertebræ of a horse or mule, with intervertebral cartilege attached. 23521.

SHELDON, H. E. (See under Granite Railway Company, Boston, Mass.)

SHELTON, J. C. (Roseland, Va.). Two samples of massive rutile from Jennie's Creek, near Roseland, Nelson County, Va. 24485.

SHEPARD, Miss C. ANTOINETTE (New Britain, Conn.). Eggs of River-snail, *Ampullaria depressa*, from Silver Springs, Fla. 24151.

SHEPARD, Dr. C. U. (Charleston, S. C.). Phosphate rock from the mines of the Dunellon Phosphate Company, near Dunellon, Marion County, Fla., and 5 samples of phosphorite. 23929.

SHEPARD, Miss IDA M. (Long Beach, Cal.). Specimen of *Tylodina californica* (23387); fossil shells from a well 25 feet deep near Long Beach (23663); through Mr. C. T. Simpson, 2 specimens of *Scalaria bellastriata* Spr. (23997).

SHEPARD, JAMES (New Britain, Conn.). Silicified fossils from Tampa Bay, Fla., and 5 species of recent shells. 23747.

SHEPARD, W. G., & Co. (New Haven, Conn.). Sample of ash wood bent by the steaming process. 24338.

SHERMAN, A. R. (Berkeley Springs, W. Va.). Hand-scourer for hides. 23405.

SHERMAN, Mrs. JOHN A. (Watertown, N. Y.). Collection of sea-mosses and ferns made by Mrs Sherman on the Pacific Coast at Santa Barbara. 24044.

SHIMEK, Prof. B. (Iowa City, Iowa). Specimens of *Pupa alticola* Ing., from the loess of Iowa. 23870.

SHINDLER, A. ZENO (U. S. National Museum). Strike-a-light *briquet* from Paris, France, patented January 26, 1837. 23977.

SHINN, Dr. V. (Washington, D. C.). Gordon setter, in the flesh. 23833.

SHOENFELT, J. B. (Waterloo, N. Y.). Onyx marble from Franklin County, Mo. 24267.

SHUFELDT, Capt. MASON N. (U. S. Navy). Sixteen photographs representing ethnological objects (23460); 18 photographs representing persons and scenes in India, Gibraltar, Arabia, and various islands of the Pacific Ocean (24344).

SHUFELDT, PERCY W. (Takoma Park, D. C.). Seven birds' skins representing seven species from various localities (23868); skin of Catbird, showing method of preparation (24348); 21 salamanders and frogs (24490).

SHUFELDT, Dr. R. W., U. S. Army (Takoma Park, D. C.). Specimen of *Desmognathus fusca* (23540); Evening Grosbeak (*Hesperiphona vespertina*) in flesh, from Fort Wingate, New Mexico (23542); 3 alcoholic specimens of *Lagomys princeps* from the Sierra Nevada Mountains (23556); skin of Mink, *Putorius vison*, from Sligo Creek (23852); 7 alcoholic specimens representing 5 species of reptiles and batrachians, and 2 alcoholic specimens of Tarantula (*Eurypelma* sp.) and Evening Grosbeak from Fort Wingate, New Mexico (24111); 2 photographs of Navajo woman weaving a belt (24339); Dragon-fly (*Tramea carolina*) from Maryland (24377); 2 snakes and a tree-frog (24488).

SHUFELDT, R. W., jr. (Takoma Park, D. C.). Raven (*Corvus corax sinuatus*) from Fort Wingate, N. Mex. (23884); 10 salamanders (24489); small collection of fishes representing the following species: *Semotilus atromaculatus, Rhinichthys atronasus; Chrosomus erythrogaster; Hybopsis biguttatus; Notropis analostana; Notropis megalops; Exoglossum maxillingua; Noturus insignis; Anguilla rostrata* juv.; *Petromyzon marinus* (24518).

SICKLES, F. E. (Kansas City, Mo.) Duplicate of original model of Sickles' lifting, tripping, and regulating machine, also Patent Office certificate and copy of drawing attached to the first patent in the world for a trip cut-off, May 20, 1842. (24427); framed tracing of steam-steering machine, patented July 17, 1860, with photograph and framed label, framed newspaper clippings from the Scientific American, September 23, 1876, and National Gazette, November 5, 1891, describing the steam-steering machine invented by Mr. Sickles (24428). Deposit.

SIKORA, FRANZ (Andrangoloka, Madagascar). Alcholic specimens of mammals. 23993. Purchase.

SIDEY, J. F. (Buffalo Gap, S. Dak.). Sixteen specimens of calcite and 2 specimens of calcareous tufa. 23710. Purchase.

SIMONDS, STEPHEN (Washington, D. C.). Golden-crowned Kinglet (*Regulus satrapa*). 23780.

SIMPSON, A. M. (Straubville, N. Dak.). Specimen of gypsum found in blue clay, at depth of from 12 to 40 feet. 24486.

SIMPSON, C. T. (See under Miss Ida M. Shepard.)

SINGER MANUFACTURING COMPANY (Hartford, Conn.), through L. Barr. Ten sewing machines. 24316.

SISSON, J. F. H. (Kinsale, Va.). Abnormal claw of Blue crab (*Callinectes hastatus*) from the Potomac River. 24161.

SLOCUM, Capt. JOSHUA. The *Liberdade*, built by Capt. Slocum on an island off the coast of Brazil. 23653.

SLOCUM, Hon. J. C. (U. S. Surveyor-General, Tallahassee, Fla.) (See under Interior Department.)

SMEDLEY, SAMUEL H. (Sanger Junction, Cal.). Glossularite from near Sanger Junction, Cal. 24313.

SMILLIE, JAMES D. (New York City, N. Y.). Three proofs from aquatint plates, made by the donor (gift). (23737): aquatint plate "Old Houses at Boulogne," with six proofs (purchase) (23761).

SMITH, E. KIRBY, Jr. (Vera Cruz, Mexico). Lantern-fly (*Fulgora lanternaria*) found half way across the Isthmus of Tehuantepec, in a dense thicket. 23453.

SMITH, Maj. GEORGE S. (Marion, Va.). Zinc ore from Virginia. 23801.

SMITH, HARLAN I. (East Saginaw, Mich.). Old spear-point, 3 arrow-points of flint, and 3 fragments of pottery from Michigan. 23926.

SMITH, HORACE G., Jr. (Denver, Colo.). Small collection of reptiles, 6 specimens, 5 species, from Colorado. 23962. Exchange.

SMITH, Dr. HUGH M. (U. S. Fish Commission). Collection of dried and pressed plants from St. George's Island (23390, 23508); dried plants representing 20 species obtained by Dr. Smith from various littoral points in New Jersey and Virginia (23461); stone taken from the stomach of Coot (*Fulica americana*) from Roan Island, North Carolina (23520); brass "fig-leaf" from Maylasia, obtained by Lieut. Commander F. Hanford, U. S. Navy (23522); 2 skins of Golden-headed Manakin (*Pipra aurocapilla*) and Blue-crowned Manakin (*Pipra coronata*) from Ecuador, South America (23559): skin of Western Horned Owl (*Bubo Virginianus subarcticus*), from New Mexico (23566); specimens of *Pecten Magellanus* from the coast of Maine (23923); photograph of side-wheel steam-packet, photograph showing the raising of a wreck in Norfolk Harbor, and one representing the wreck of a four-masted schooner (purchase) (23953); nest and egg of *Vireo flavifrons*, 2 nests and 5 eggs of *Vireo olivaceus*, 3 nests and 4 eggs of *Dendroica æstiva*, nest and egg of *Dendroica discolor*, nest of *Contopus virens*, egg of *Falco sparverius* and *Aegialitis vocifera*, from the District of Columbia (24072); Bat., *Vesperugo fuscus* (24284); 2 water-snakes, *Tropidonotus sipedon*, from the Potomac River (24397); 13 small Turtles from the Potomac River, collected by Mr. William P. Seal (24413).

SMITH, Prof. JOHN B. (New Brunswick, N. J.). Eight species of miscellaneous insects (23580); series of North American noctuidæ consisting of 15 specimens representing 12 species (23933); specimen of *Carabus truncaticollis* Fisch, from Alaska (23940); 20 microscopic slides illustrating a paper by Prof. Smith, on mouth parts of diptera, and also a copy of the paper (24135); 19 species of Canadian moths named by F. Walker, of the British Museum, about 1865, from the collection of Rev. J. S. Bethune (24251).

SMITH, Dr. LLOYD H. (Easton, Md.). Living Owl. 24497.

SMITH, Capt. O. M., U. S. Army (War Department). Springfield rifle bullet partially pierced by a nail at target range at Fort Keogh, Mont., in June, 1890. 23948.

SMITH, WILLIAM G. (Loveland, Colo.). Two specimens of Swainson's Hace (*Buteo Swainsoni*) and deformed head of Red-winged Blackbird (*Agelaius phœniceus*) (gift) (23535); skin of Plumbeous Vireo (*Vireo solitarius plumbeus*) from Colorado (gift) (24041); skin of Flammulated Screech-owl (*Megascops flammeolus*) from Colorado (purchase) (24042); 4 eggs of *Megascops flammeolus*, 2 nests and 8 eggs of *Vireo solitarius plumbeus*, 4 eggs of *Phalaropus tricolor*, and 5 eggs of *Calamospiza melanocorys* (purchase) (24050).

SMITHSONIAN INSTITUTION, through Hon. William F. Wharton, Assistant Secretary of State. Medal awarded by the late Paris International Exhibition to the Smithsonian Institution, and transmitted by the Department of State (gift) (24105); bronze medal from the University of Montpelier, France (deposit) (24293).

SMOCK, J. C. (See under New York State Museum.)

SNOW, CHARLES H. (Silver City, N. Mex.). Smithsonite from Dubuque, Iowa. 23404.

SNYDER, F. D. (See under Bureau of Ethnology.)

SNYDER, Dr. J. F. (Virginia, Ill.). Cast of stone from cliff dwellings on the Rio Verde River, Arizona. 23431.

SPARKS, FRANK W. (St. Louis, Mo.), through Dr. T. H. Bean. Mounted Fulvous Tree-duck (*Dendrocygna fulva*) from New Madrid, Mo. 24462.

SPENCER, Miss FLORENCE I. (Oak Lawn, Fla.). Horse-hair Snake (*Gordius* genus). 23479.

SPENCER, Dr. J. W. (Atlanta, Ga.). Specimens of Miocene fossils from Thomas County, Fla. 23443.

SPILLMAN, W. J. (Vincennes, Ind.). Forty-five species of plants. 23619.

SPRAY, S. J. (Salida, Colo.). Skin of Piñon Jay (*Cyanocephalus cyanocephalus*) from Colorado. 23528.

STABLER, HAROLD B. (Sandy Spring, Md.). Cooper's Hawk (24006); Red-shouldered Hawk (*Buteo lineatus*) and Screech Owl (*Megascops asio*) in the flesh (23981, 24053).

STABLER, JAMES P. (Sandy Spring, Md.). Two hawks (*Buteo borealis* and *Buteo lineatus*) in the flesh (23876;) Red-shouldered Hawk (*Buteo lineatus*) (23881.); 2 Sparrow Hawks (*Tinnunculus sparverius*), and Sharp-shinned Hawk (*Accipiter fuscus*) (24240).

STAIGG, Mrs. R. M. (Boston, Mass.). Two proofs of a "Portrait of Edward Everett," engraved by John Cheney, from a miniature by R. M. Staigg. 24035.

STANARD, Dr. O. B. (Sandwich, Ill.). Cast of tooth of mammal, found in Kendall County, Ill. 24079.

STANDING, A. J. (Carlisle, Pa.). Cheyenne war bonnet, Sioux smoking outfit, and 3 Assiniaboine squaw belts. 23370. Purchase.

STANTON, T. W. (U. S. Geological Survey). Eighteen arrow-points, found in a field on Cowikee Creek, 8 miles northwest of Eufala, Ala. 24200.

STANTON, W. J. (New York City, N. Y.). Parlor Tumbler pigeon and Black Jacobin pigeon. 23826.

STATE, DEPARTMENT OF.

Through Hon. William F. Wharton, Assistant Secretary: Two medals awarded to the Government of the United States for its exhibits at the late Paris International Exhibition (24104); 2 diplomas awarded to the Government of the United States at the late Paris International Exhibition (24127).

Through Mr. Sevellon A. Brown, chief clerk: Two bricks with cuneiform and other inscriptions (24201); samples of Chinese ramie, in various stages of manufacture, and a printed report of the consul-general of the United States at Shanghai, describing the specimens (24487).

Collected by the United States consul at Catania, Italy: Seven specimens of celestite with sulphur (23505). (See under Walter J. Koehler.)

STEARNS, FREDERICK (Detroit, Mich.). Collection of Japanese shells. 24417. Exchange.)

STEARNS, Prof. W. A. (Cambridge, Mass.). Alcoholic specimens of fishes from Arichat, Cape Breton, Nova Scotia, marine invertebrates, comprising crustaceans, worms, echinoderms, and others from the same localities; mollusks, Beetles, *Ocypus ater*, *Criocephalus asperatus*, and a Myriopod (*Lithobius*) reptiles and algæ, from the same locality. 23662.

STEINER, R. (Waynesboro, Ga.). Collection of 154 specimens of chipped flint implements of paleolithic type found in the vicinity of Waynesboro. 24147.

STEINWEG, Mrs. S. E. (See under Fritillaria Club of Yakima Valley.)

STEJNEGER, Dr. LEONHARD (U. S. National Museum). Twelve birds representing 9 species from Arizona, collected by Dr. Stejneger. 23506. (See under Master E. Bull).

STERLING, Dr. E. (Cleveland, Ohio). Stuffed skin of mole (*Scalops aquaticus*). 23450.

STEVENS, G. A. K. (Barton, Fla.). Scute from carapace of fossil Glyptodon (*Clamydotherium humboldti*). 24051.

STEVENSON, Prof. J. J. (New York City, N. Y.). Crude petroleum from Berksville, Ky. 24163. Exchange.

STINCHCOMB, A. A. (St. Margaret, Md.). Living scarlet snake (*Cemophora cocinea*). 24283.

STOUT, IRA H. (St. Louis, Mo.), through Prof. O. T. Mason. Photograph of air ship. 23607.

STRAUS, Hon. O. S. (New York City, N. Y.). Cast of the Jerusalem Stele, a Greek inscription from the Temple of Jerusalem, taken from the original in the Imperial Museum, Constantinople, Turkey. 23499.

STRONG, F. M. (Wheeling, W. Va.). Luna Silk-moth. 24421.

STROUD, Mrs. MARY (Washington, D. C.). Mezzotint "Portrait of Prof. Johnson" by Sartain (deposit); oil portrait of the late Walter R. Johnson (deposit); 14 early daguerreotypes, made with a camera which was imported from France by Prof.

STROUD, Mrs. MARY—Continued.
Johnson soon after the art was discovered (deposit); collection of Russian minerals given in 1845 by the Russian Government to Walter R. Johnson, of Washington, and minerals; consisting of garnet, iolite, emerald, beryl, corundum, monazite, xanthophyllite, crocoite, vauquelinite, cassiterite, malachite, molybdite, pargasite, fahlunite, phenakite, leuchtenbergite, sodalite, zircon, samarskite, tscheffkinite, glinkite, onvarovite, and volborthite (gift). 23598.

STUBBS, Dr. Charles M. (Wakefield, Pa.). Nineteen stone "picks"* and 5 fragments of potstone vessels found near Wakefield, Lancaster County, Pa. 23752.

STURTZ, B. (Bonn, Prussia). Fifty-five specimens of rocks from Europe (23654); ores (24196). Exchange.

SULZBERGER, Dr. D. (Philadelphia, Pa.). Meruzza, wrapper for Pentateuch, and 2 citrons. 23635.

SULZBERGER, M. (Philadelphia, Pa.). Jewish wedding-ring, circumcision-knife, and gold amulet. 23660. Purchase.

SULZBERGER, Mrs. S. (Chicago, Ill.). Two engravings illustrating events in Hebrew history. 23610.

SURBER, THADDEUS (White Sulphur Springs, W. Va.). Twelve eggs (3 sets) of Sparrow Hawk (*Falco sparverius*), 7 eggs (2 sets) of American crow (*Corvus americanus*), 4 eggs (1 set) of Blue Jay (*Cyanocitta cristata*), 4 eggs (1 set) of Mockingbird (*Mimus polyglottus*), and 12 eggs (3 sets) of Tricolored Blackbird (*Agelaius tricolor*) from West Virginia. 24308.

SWEENEY, T. W. (U. S. National Museum). Two iron fire-place lamps (Unschals) and a combination fat-lamp and candlestick from York County, Pa. 23525.

SYRACUSE PLOW COMPANY (Syracuse, N. Y.). Model of steel plow. 24060.

TANNER, WILLIAM G. (Sandy Hill, N. Y.). Two specimens of garnet bowlder, specimens of graphite and hornblende in calcite, hornblende containing scales of graphite, graphite, and 6 miscellaneous specimens. 24058.

TAPPAN, Col. S. F. (Washington, D. C.). Shirt made of chain armor, captured by H. M. Stanley from brigands at Chihissuar, Asia Minor, in 1868. 23839.

TARR, EDWIN P. (McCartys', N. Mex.). Alcoholic specimens of insects. 23637.

TAUBER, Miss ELIZA M. (Gladdeus, Pa.). Specimen of *Fomer graveolens* Schw. 24330.

TAYLOR, A. R. (Columbia, S. C.). Nests of *Vireo noveboracensis*, *Dendroica discolor*, *Dendroica vigorsii*, *and Compsothlypis americana*. 24073.

TAYLOR, F. W. (El Paso, Tex.). Alabandite from Kingston, N. Mex. 24500.

TEST, F. C. (U. S. National Museum). Two specimens of Black-snake (*Bascanion constrictor*) from Laurel, Md. (24245); snake from Fort Foote, Md. (24515).

THE BISHOP TAYLOR MISSION (Loanda, Angola, Africa), through Rev. William P. Dodson, superintendent, and Prof. Cleveland Abbe. Kimbunda hatchet, called "Dikellemba," made by a native smith of the Lunda country, and used in hacking down small trees, killing cattle, etc.; Kimbunda basket, called "Kinda," made by a native woman of Angola. 23667.

THE EASTMAN COMPANY (Rochester, N. Y.). Enlarged photograph of steamer *Samuel J. Pentz*, on Eastman's permanent bromide paper. 24507.

THE HINDS KETCHAM COMPANY (Brooklyn, N. Y.), through Mr. J. E. Hinds, president. Collection of incandescent lamps, switches, and other apparatus used in 1881, in one of the earliest electric-light plants in America. 24315. Deposit.

THE JOHN D. HOFF ASBESTUS COMPANY (San Diego, Cal.). Asbestus from near San Diego. 24507.

THE PHOTOGRAPHERS' ASSOCIATION OF AMERICA. Dauguerre memorial monument. 23817.

THE PYRITE COMPANY LIMITED (New York City, N. Y.). Specimens of pyrite from Pilley's Island, Newfoundland. 24408.

* The picks were used in the manufacture of potstone vessels by the Shawnee Indians, who at one time occupied the country where the specimens were found.

THISELTON-DYER, Dr. W. T. (See under Royal Botanical Gardens, Kew, England.)

THOMAS, FRED. L. (Ashton, Md.). Two Hawks, *Accipiter fuscus*, for skeletons. 24415.

THOMPSON, JOHN F. (See under Museo de Productos Argentinos.)

THORN, A. B. (Washington, D. C.). Bantam chicken and fowl. (23398, 23572.)

THRELKELD, E. R. (Los Angeles, Cal.). Specimen of graphite. 24059.

TICKNOR, F. A. (Rockford, Ill.). Fragments of human skull supposed to have been taken from a mound near Rockford, and a copper spear-head from the same locality. 24273. Deposit.

TIFFANY & Co. (New York City, N. Y.). Mosaic slab of agatized wood from Chalcedony Park, Arizona, and miscellaneous specimens of minerals. 24359. Purchase.

TODD, AURELIUS (Eugene, Oregon). Skin and skull of Tree-mouse, type of *Phenacomys longicaudus* True, from Marshfield, Coos Co., Oregon. 23480.

TODD, E. R. (U. S. National Museum). Two eggs of Woodcock (*Philohela minor*) from Lower Cedar Point, Md. 24198.

TODD, JAMES (Pittsburg, Pa.). Silver watch with fob-chain, seal, and pendant, said to have been taken from a British soldier at the battle of Lexington, 1775, by Lieut. James Todd, of Boston, belonging to the Continental Army. 23380.

TODD, W. E. C. (See under Dr. C. Hart Merriam.)

TOKUNO, T. (Chief of Insetsu Kioku, Tokio, Japan). Six sheets of color prints from paintings by Japanese artists, and 5 illustrated Japanese books. 23893.

TRAILL, W. E. (Fort St. James, Stuart's Lake, British Columbia). Skin and 15 specimens, representing 3 sets, of eggs of Franklin's Grouse (*Dendragapus franklinii*), 4 eggs (1 set) of Greater Yellowlegs (*Totanus melanoleucus*) from Fort George; skin and 9 eggs (1 set) of Canadian Ruffed Grouse (*Bonasa umbellus togata*); 3 skins of Hoary Marmot (*Arctomys pruinosus* Gmelin=*Arctomys caligatus* Eschscholtz) from the mountains near Babine, British Columbia, and alcoholic specimens of Salmon from New Caledonia. 23758.

TRAVERS, R. P. (Chicago, Ill.). Nickel and copper ore from Sudbury District, Canada, and nickel ore from the Chicago Nickel Company, Inez Mine, Travers, Algona District, Ontario, Canada. 24153.

TREASURY DEPARTMENT, U. S.

Bureau of Printing and Engraving, through Hon. William M. Meredith, chief of Bureau. Two hundred and sixty-two unmounted India impressions of portraits, vignettes, and lathe work. 23618.

Coast and Geodetic Survey, through Dr. T. C. Mendenhall, superintendent. Sixty-nine specimens consisting of fragments of human bones, clay vessels, and fragments of pottery, found about a foot and a half below the surface at Hatche's Point, now Pen Land, New River, Onslow County, N. C. (23255).

U. S Revenue Marine, through Capt. W. C. Coulson, U. S. R. Cutter *Rush*. Skin of Walrus (*Odobænus obesus*), an adult male from Walrus Island, Bering Sea. 23850.

HAMILTON, JOHN B., Supervising Surgeon-General, U. S. Marine Hospital Bureau. Piece of lignite found between Florence and Rome, used for fuel in many parts of Italy. 23726.

PRESTON, E. D. Crab, *Grapsus maculatus*, from Nonsuch Island, Bermuda Islands. (23436).

TREGO, CHARLES T. (Chicago, Ill.). Specimen of feldspar from the mines at Rosiclare, Ill. 24180.

TROYE, Mrs. EDWARD, through Hon. W. C. P. Breckinridge. Equestrian portrait of Gen. Winfield Scott, by the late Edward Troye. 23905. Deposit.

TRUE, FREDERICK W. (See under William C. Carroll.)

TURNER, H. W. (See under Interior Department, U. S. Geological Survey.)

TURNER, L. M. (Guthrie, Okla. Ter.). Box-tortoise (*Cistudo ornata*), from Kingfisher, Okla., (23386); specimens of *Physa gyrina* Say. (23466.)

TURPE, A. (Brackettsville, Tex.). Two skins of *Lepidosteus tristoechus and Hapli-donotus grunniens*, and 3 skins of Texas Wildcat from near Padrapinta Creek, Kinney County, Tex. (23551); obsidian (volcanic glass) pebbles from Texas. (23644.)

UDDEN, J. A. (Rock Island, Ill.). Specimens of volcanic dust from Kansas and Colorado. 24217. Exchange.

ULKE, HENRY (Washington, D. C.). Thirty-seven specimens representing 19 species of rare North American coleoptera, nicely mounted, and nearly all new to the collection. 23620.

ULKE, TITUS (Hill City, S. Dak.). Vertebra of fossil mammal, *Brontotherium* from Iron Camp, Black Hills, South Dakota (23545); specimen of phosgenite from Broken Hill, Australia, and fibrous meerschaum from Little Cottonwood, Utah (23628); six specimens of minerals from Harney Peak Mining District, South Dakota, consisting of staurolite, cassiterite, beryl, muscovite, and spodumene, and seven samples of tin ore from the same locality (23722); tin anvil smelted from ore from Cowboy mine, and sample of tin ore. (23732.)

UNIVERSITY OF NEW BRUNSWICK (Fredericton, New Brunswick), through L. W. Bailey. Stone gouge, polished hatchet, and hatchet-shaped pebble, 10 specimens of Canadian fossils, six fossil plants, 23 specimens of Canadian minerals, consisting of wollastonite, pyroxene, ouvarovite, calcite, magnetite, graphite, sphene, vesuvianite, amphibole, scapolite, apatite, biotite, garnet, pyrrhotite, tourmaline, stelbite, spophyllite, and thompsonite; and Canadian rocks. 23712.

UNIVERSITY OF PENNSYLVANIA, through Charles M. Buck. Two Antelope skins and skin of Brown Pelican (*Pelecanus fuscus*) from the Philadelphia Zoölogical Garden. 23880.

UNIVERSITY OF WISCONSIN (Madison, Wis.), through Prof. William H. Hobbs. Sixty-two specimens of minerals from Illinois and Wisconsin, consisting of galena, smithsonite pseudomorph after calcite, smithsonite pseudomorph after galena, limonite pseudomorph after pyrite, marcasite, calcite, sphalerite, and chalcopyrite (23385); calcite from Mineral Point, Wis., and 5 specimens of calcite from Galena, Ill. (23634). Exchange.

UPHAM, E. P. (U. S. National Museum). Chanot Violin. 23406. Deposit.

VAIL, Mrs. AMANDA (New Britain, Conn.), through J. E. Watkins, U. S. National Museum. Two letters from Alfred Vail & Son, February, 1838, describing the operations of the magnetic telegraph machine in the room of the Committee on Commerce at the United States Capitol, 2 sheets of lithographs of early electric telegraph machine, and 6 sheets of drawings of details of early electric telegraph machines, drawn by Alfred Vail, 1837–1847. 23562. Deposit.

VAIL, STEPHEN (New York City, N. Y.). Paper ribbon containing dot and dash record of the first Presidential election reported by electric telegraph, November 5, 1844. 23568. Deposit.

VAILLANT, LÉON. (See under Museum of Natural History, Paris, France.)

VAN CLEANE, JAMES R. B. (See under Fish Commission, United States.)

VAN INGEN, GILBERT (U. S. Geological Survey). Fossil plant, *Lepidodendron Brittsi*. 23513.

VARLEY, T. P. (Woodwardville, Md.). Two hammer-stones, 3 chipped hatchets, grooved axe, grooved quartzite pebble (sinker), fragment of a polished stone implement, 3 fragments of pierced tablets, large chipped implement, 7 worked flakes of flint, jasper, and slate, 3 flint scrapers, 22 rude points and leaf-shaped implements of quartz, quartzite and argillite, 18 spear-points of quartzite, indurated slate, etc., 130 arrow-points of flint, slate, quartzite, and quartz, 12 fragments of pottery, 6 natural formations resembling worked stone and a fossil shark's tooth, numbering 211 specimens from Anne Arundel County, Md. 23925.

VAUGHN, T. WAYLAND (Mount Lebanon, La.). Specimens of land-shells. 24445.

VESTERLUND, OTTO (Edepors, Harads, Sweden). Specimens of Florida plants. 24453.

VON IHERING, Dr. H. (Rio Grande do Sul, Brazil, South America). Nine species of recent shells and 16 species of fossils (24102); collection of fresh-water shells from Southern Brazil. (24139.)

WADSWORTH, Dr. M. E. (Houghton, Mich.). One hundred and eighty-five specimens of rocks and ores from Michigan; Florida phosphates; 3 specimens of nickel ore from Dracut, Mass; 2 nickel-copper ores and 2 specimens of picrolite from Canada. 24101. Exchange.

WALCOTT, CHARLES D. (See under Interior Department, U. S. Geological Survey.)

WALCOTT, Mrs. H. B. (Washington, D. C.). One hundred and eighty-six specimens of fossils, including slabs with numerous shells, etc., from the Oriskany sandstone of New York. 23647. Exchange.

WALKER, F. (See under Prof. John B. Smith).

WALLACE, SHIPPEN (Philadelphia, Pa.). Samples of roasted bogus coffee. 24138.

WALTERS, J. H. (Washington, D. C.). Male specimen of Red-tailed Hawk (*Buteo borealis*). 23806.

WAR DEPARTMENT.

Quartermaster-General, U. S. Army. (See under Alaska Commercial Company, San Francisco, Cal., F. W. Crosby, and William O. O'Neill).

WARD, Miss ANNA L. (Waterbury, Conn.). Seal-skin pouches used by the Eskimos of Labrador (24381); coiled meal tray, obtained in Labrador by Miss Ward and Miss Florentine H. Hayden (24511).

WARD, ELBORN T. (Trinidad, Colo.). Iron hanging lamp, of French make, found in an old adobe building. 23657. Deposit.

WARD, Prof. H. A. (Rochester, N. Y.). Two glass sponges, *Euplectella speciosa* and *Hyalonema sieboldi* (purchase) (23856); crustaceans (exchange) (23998).

WARD, Prof. LESTER F. (U. S. Geological Survey). Two fine specimens of *Zamia integrifolia* from Florida (24096); natural grafting illustrated by two black oaks inarched (24337). (See under Interior Department, U. S. Geological Survey.)

WARD, S. G. (Washington, D. C.), through Mr. S. P. Langley, Secretary Smithsonian Institution. Etching by Jacques Callot, "Supplicium sceleri frænum." 24227.

WARD'S NATURAL SCIENCE ESTABLISHMENT (Rochester, N. Y.). Kelaart's Monkey (*Semnopithecus kelaartii*), from Ceylon, India (exchange) (23714); Wombat (*Phascolomys latifrons*) (exchange) (23820); alcoholic specimen of *Nyctinomus norfolcensis* (gift) (23921); 10 specimens of corals and sponges (purchase) (24007).

WARD & HOWELL (Rochester, N. Y.). Fragment of meteorite from Llano del Inca, Chile. 23394.

WARE, N. (Garfield, D. C.). Piece of wood found 24 feet below the surface in digging a well on Good Hope Hill, District of Columbia. 23396.

WARNEKE, C W. (Washington, D. C.), through Lloyd Mockabee. South American Monkey (*Chrysothrix sciurea*). 24285.

WASHINGTON, LAWRENCE (Marshall, Va.). Overseer's weekly report-book of Mount Vernon estate from September 16, 1797, to January 26, 1799, with indorsements in handwriting of George Washington; overseer's daily report-book of Mount Vernon estate from January 7 to September 10, 1797, with list of negroes on Mount Vernon estate in 1786, and ledger account of overseer, 1786 to 1793 (23615); original will of Lieut. Col. John Washington, great-grandfather of Gen. George Washington, dated September 21, 1675; deed of release of 2,500 acres of land on Little Hunting Creek, Virginia, by Rodger and Mildred Gregory to Augustine Washington, father of Gen. Washington, May 17, 1726; bargain and sale of 1,906 acres of land on Little Hunting Creek, Thompson to Rose, May 8, 1689, and copy of boundaries of same; agreement with Mr. John West for sale of land, with indorsement from Washington to Pendleton, and opinion of Pendleton; certified copy of the will of Augustine Washington, dated April 11, 1743; deed of release, John Manly to Daniel French, 68 acres of land in Fairfax County, August 29, 1746; copy in handwriting of George Washington, of bond to Mr. William Triplett, concerning purchase of 142 acres of land; certified copy of will of Lawrence Washington (half-brother of George), June 20, 1752; written copy of "The

WASHINGTON, LAWRENCE—Continued.
Daily Sacrifice" (Sunday morning to Thursday morning) apparently in handwriting of George Washington when a youth; certificate of membership of Hon. Bushrod Washington in Bunker Hill Monument Association; certificate of membership of Bushrod Washington (Associate Justice of the United States Supreme Court) in American Philosophical Society, July 19, 1805, signed by Thomas Jefferson as president of the society; certificate of College of New Jersey conferring degree of doctor of laws upon Bushrod Washington, October, 1803; ledger account-book of manager of Mount Vernon estate, 1794–1796, with indorsement in handwriting of George Washington. (23674.) Deposit.

WASHINGTON, Col. T. A. (Washington, D. C.). Brick from Wakefield, Va., the birthplace of George Washington. 23815.

WATKINS, J. E. (U. S. National Museum). Cuttings from "Art Journal" and "Journal of Franklin Institute," containing articles on the history and the technique of art (23776); collection of engravings, prints, and photographs of locomotives, cars, track-standard, bridges, and original rail-sections (24450). (See under Mrs. Amanda Vail.)

WAY, N. S. (Yorklyn, Del.). Rude notched implement. 23751.

WEBB, Judge JOHN G. (Osprey, Fla.). Two pieces of sandstone rock containing fossil human bones found on the shore of Sarasota Bay, near Osprey (23727); human skull turned to limonite, from near Osprey (24115).

WEBB, WALTER T. (Geneva, N. Y.). Fifteen eggs (4 sets) of Red-shouldered Hawk (*Buteo lineatus*), and 3 eggs (1 set) of Red-tailed Hawk (*Buteo borealis*). 24263.

WEBSTER, GEORGE W. (Lake Helen, Fla.). Eight species, representing several samples of land and fresh-water shells of North America. 23980.

WEED, W. H. (U. S. Geological Survey). Two specimens of coal from Cinnabar coalfield, Montana. 24326.

WEEDON, W. C. (See under National Zoölogical Park).

WELCH, CHARLES. (See under Guildhall Library Committee of the City of London.)

WESTERDAHL, G. J. (San Carlos, Ariz.). Living specimen of Gila (*Heloderma suspectum*). 24354.

WHARTON, Hon. WILLIAM F. (See under Smithsonian Institution, and State Department.)

WHEATLAND, Dr. HENRY. (See under Essex Institute, Salem, Mass.)

WHEELER, CHARLES L. (Cape May, N. J.). Set of marine and land shells. 24465.

WHEILDON, W. W. (Concord, Mass.). Copy of souvenir under the corner stone of the new statehouse extension, Boston, December 21, 1889, and a piece of the "Old North Bridge" at Concord. 23483.

WHITE, Dr. C. A. (U. S. Geological Survey). Collection of mixed shells, mostly fresh-water, from Iowa and other localities, specimens of gorgonian, gypsum, and stalactite. 24458.

WHITE, C. H. (Bradford, Mass.). Specimen of *Erax æstuans* Wied., from Dover, N. H. 23518.

WHITE, DAVID. (See under Baron Ferd von Mueller.)

WHITE, E. D. (U. S. National Museum). Clays, from Gay Head, Marthas' Vineyard, Mass. 23659.

WHITE, Prof. I. C. (West Virginia University, Morgantown, W. Va.). Carved wooden oil vessel, from the Solomon Islands, inlaid with shell and bone, representing a monkey bearing on his back the body of a bird, collected by Lieut. W. I. Moore, U. S. Navy. 23745. Exchange.

WHITE, J. J. (Palm Beach, Fla.) Specimen of *Spirula fragilis* = *Peronii*, with part of animal and shell. 23864.

WHITE RIVER QUARRY COMPANY (Bedford, Ind.), through George F. Cochower, agent of the builders' exchange. Six-inch cube of oölitic limestone. 24352.

WHITEHALL GOLD MINING AND MILLING COMPANY (Washington, D. C.). Specimen of native gold and tetradymite from Whitehall gold mine, Spottsylvania County, Va. 24249.

WICKAM, H. F. (See under Department of Agriculture.)

WILCOX, A. C. (Washington, D. C.). Fourteen copper coins, consisting of English pennies of George II, 1731 and 1736; George III, 1774, 1775, 1779, and 1806; George IV, date illegible; Irish half-penny, George III, 1782; penny, Queen Victoria, 1860; Canadian cent, 1859; Nova Scotia half-penny, 1832; Bank of Montreal half-penny token, 1842; U. S. Bank token (hog type), 1843; and un centovo of Mexico, 1878 (23534); letter dated December 13, 1816, from G. Mason, Commissary-General of Prisons, to Moses Young, of Washington; certificate of identification to Isaac Linken as an American citizen, September 7, 1803; indenture of Chr. T. Wilhelm as apprentice to Andrew Tucker of schooner *Lydia*, of Marblehead, dated at Bordeaux, March 24, 1807 (23604).

WILCOX, Maj. JOHN H., U. S. Army (Fort Keogh, Mont.). Indian bow from Yellowstone Park, Wyoming. 23560.

WILD, G. L. & BROTHERS (Washington, D. C.). Carroll Concert Grand Piano, six and three-quarter octaves, Viennese action, made by H. Kisting & Son, Berlin, Germany. 24259. Purchase.

WILEY, C. A. (Miles City, Mont.). Fifty specimens of coleoptera and 75 specimens of lepidoptera. 24174.

WILLCOX, JOSEPH (Philadelphia, Pa.). Fossil human bone, socket of femur closed in limonite found in 1886 by Col. Willcox and Prof. Heilprin at Sarasota Bay, Fla. (24357); tertiary fossils (24447).

WILLIAMS, Dr. GEORGE H. (See under Interior Department, U. S. Geological Survey.)

WILLIAMS, TALCOTT (Philadelphia, Pa.). Ethnological collection and various other material.* 23736.

WILLIAMS, Mrs. TALCOTT (Philadelphia, Pa.). Collection of embroideries, rugs, hangings, and other articles from the Mr. R. Lewis sale. 24501. (Purchased by Mrs. Williams for the National Museum.)

WILLIAMSON, Mrs. M. BURTON (University, Cal). Specimen of *Periploma discus* Stearns, from Long Beach (23485); 2 species of marine shells from Catalina Island, California (23681); 3 specimens of *Haliotis cracherodii* from St. Vincent, Los Angeles County, Cal., (23844).

WILLIGE, J. LOUIS (U. S. National Museum). Pistol, for many years in the possession of the late Samuel E. Douglass, of Washington, D. C. 24106.

WILLIS, THOMAS J. (Melitota, Md.), through Thomas Jewell. Two grooved stone axes and 5 arrow-heads from Kent County. 23440.

WILSON, M. (Center Market, Washington, D. C.). Two specimens of Barracuda (*Sphyræna guaguancho*). 23371.

WILSON, THOMAS (U. S. National Museum). Bronze sword, 20½ inches long, from Italy. 23823. Deposit.

WIMSATT, W. A. (Washington, D. C.). Seven specimens of lignite from Forestburg, Va. 23655.

WINKLEY, Rev. H. W. (Saco, Me.). Specimens of *Lunatia triseriata* Say (juv) and fossil, *Lyonsia arenosa* Moller (fossil) from Maine. 23688.

WINN, Lieut. J. S. (Fort Huachuca, Ariz.). Skin of Coati (*Nasua narica*), from Huachuca Mountains. 24510.

WINTON, GEORGE B. (San Luis Potosi, Mexico). Three specimens of Cactus-wren (*Campylorhynchus brunneicapillus*) in flesh, and 2 Lark Buntings (*Calamospiza melanocorys*) (23860); 6 specimens of birds, representing 5 species (23992); 4 specimens of birds, representing 4 species (24130).

WITTKUGEL, ERICH (San Pedro Sula, Honduras). One hundred and ninety-four birds' skins, representing 86 species, also 12 mammals. 24394. Purchase.

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*A detailed statement of this collection will be given in a later report.

WOLFF, Prof. J. E. (Harvard University, Cambridge, Mass.). Theralite from the localities on Upper Shield River basin, Crazy Mountains, Montana. 23730. Exchange.

WOLTZ, GEORGE (U. S. National Museum). Fig-leaf apron, and a pair of white linen moccasins used in Mormon Temple, Salt Lake City, Utah (23481); copper silvered candle-extinguisher more than ninety years old. (24226).

WORTHEN, CHARLES K. (Warsaw, Ill.). Collection of skins of small mammals (23741); 2 skins of Raccoon (*Procyon lotor*) (24068); 33 skins and skulls of small mammals (24069); 5 skins of Spermophiles from California (24092); 14 skins of small mammals from the United States (24265); 62 specimens, representing 20 species of reptiles, from Cameron County, Tex. (24410). Purchase.

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WRIGHT, J. MONTGOMERY. (See under William B. Hornblower.)

WUNDERLICH, H., & Co. (New York City, N. Y.). White-line cut of the sixteenth century. 23669. Purchase.

YEATES, W. S. (See under Hon. H. G. Ewart.)

YODER, Hon. S. S. (See under S. M. Fletcher.)

ZIMMERMAN, O. B. (Milwaukee, Wis.), through Capt. Charles E. Bendire, U. S. Army. Skins of Vesper Sparrow (*Poœcetes gramineus*) and Prairie Horned Lark (*Otocoris alpestris praticola*). 24298.

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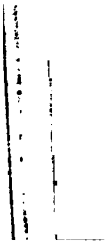

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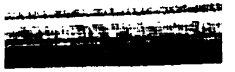

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